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# **USSR Report**

**CHEMISTRY**

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## USSR REPORT

## CHEMISTRY

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## ADSORPTION

UDC 547.1'13

### ADSORPTION OF TRANSITION METAL $\pi$ -COMPLEXES ON METALLIZED SURFACES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 23 Oct 84) pp 2387-2392

[Article by L.M. Dyagileva, Ye.I. Tsyganova and Yu.A. Aleksandrov, Scientific Research Institute of Chemistry, Gorkiy State University imeni N.I. Lobachevskiy]

[Abstract] An analysis was conducted on the adsorption isotherms of ethyl- and butylferrocene and ethylbenzene-diethylbenzenecromium (I) on quartz, as well as on iron- and chromium-metallized quartz. The alkylferrocenes showed less efficient adsorption to the metallized and unmetallized surface than I; with high degree of occupancy physical adsorption predominated. With low levels of adsorption on iron-metallized quartz, complexes involving charge transfer are formed in the case of the alkylferrocenes. Adsorption of I on chromium-metallized quartz involves highly specific interactions leading to chemisorption. However, with unmetallized quartz nonspecific interactions prevail, leading to physical adsorption. On chromium-metallized quartz adsorptivity ranked as follows: I > ethylferrocene > ethylbenzene > benzene. The nature of interaction was thus dependent on the nature of the  $\pi$ -complex and the nature of the active sites on the adsorptive surface, as well as the degree of saturation. Figures 3; references 6 (Russian).

12172/12379  
CSO: 1841/262

## ANALYTICAL CHEMISTRY

### CALL FOR MORE AND BETTER ANALYTICAL INSTRUMENTS

Moscow PRAVDA in Russian 16 Dec 85 p 2

[Article by Zolotov, Yu., corresponding member of the USSR Academy of Sciences and Kunin, L., doctor of technical sciences]

[Excerpt] Chemical analysis is employed in practically all industries.

The number of analyses is growing steadily and rapidly, and therefore it is necessary either to increase the number of specialists substantially (their number already is in the tens of thousands), or to increase their productivity by a considerable degree. The status of analytical instrument building, however, is not satisfactory, which is causing a substantial loss for the economy. The problem is that the development and production of analytical equipment are scattered. Most of these instruments are produced by the Ministry of Instrument Building, Means of Automation and Control Systems, but it is not providing the necessary assortment and volume. Industry ministries and agencies have been forced to organize production of instruments themselves, but in limited quantities and mainly for their own needs.

The production of certain instruments that are needed in the economy has not been organized at all. Moreover, existing equipment in many cases is not being used efficiently enough, which is due in particular to lack of spare parts and necessary maintenance. It should be noted that an adequate assortment of instruments for x-ray fluorographic analysis has been made available in the country, but the volume of their production is meeting only about one-third of the demand.

The efficiency of utilization of existing analytical instruments remains relatively low: by some estimates, it does not exceed 10-20 percent. Centers for collective use of instruments are needed, which would help to efficiently organize measurements on the scale of an institution, a city, a region or an agency. For a long time there has been a need for resolving the question of creating an Analytical Center of the USSR Academy of Sciences in Moscow.

In a number of industries, analytical chemistry has outgrown the status of an auxiliary service and has become an inseparable part of the main production process. An example of this can be seen in the dozens of automated analytical-monitoring systems which are operating at enterprises of the USSR Ministry of Nonferrous Metals; they are yielding an annual economic effect of 100,000 to 300,000 rubles per system.

We think that it is necessary for the importance of analytical instrument building to be reflected in an appropriate manner in the Main Directions [of the Economic and Social Development of the USSR for 1986-1990 and for the Period up to the Year 2000]. In the section "The Machine Building Complex", it would be desirable to add the following to the second paragraph of the subsection on instrument building: "Provide for the development and start of series production of automatic means of technical diagnostics of machines and equipment, means of nondestructive testing, instruments for chemical analysis, complexes of new instruments. . ."

FTD/SNAP/12379  
CSO: 1841/280

BIOCHEMISTRY

UDC 541.124:577.128

KINETICS OF REDUCTION OF PEROXIDASE BY VIOLOGENS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 4, No 10, Oct 85 (manuscript received 25 Mar 84) pp 1398-1402

[Article by V.Y. Razumas, A.V. Gudavichyus, and Yu.Yu. Kulis, Institute of Biochemistry, Lithuanian SSR Academy of Sciences, Vilnius]

[Abstract] The purpose of this work was to study the reduction of ferroperoxidase from horse radish by the cation radicals of N,N'-dialkyl derivatives of 4,4'-dipyridyl (violet cation radicals) generated electrochemically, and to interpret the results obtained within the framework of the theory of extraspherical and tunnel electron transfer. The electrochemical and spectroelectrochemical measurements performed showed that the methylviologen cation radical reduces the active center of peroxidase without preliminary formation of a complex. The rate constant of the reaction is less than half the rate constant of reduction of ferricytochrome from previous works. The results obtained were processed using the theory of tunnel electron transfer. The electron transfer distance in this case is 5.8 Å, assuming that the wave function attenuation constant for the protein molecule is 0.7 Å. The parameter of vibration synchronization  $\Delta \approx 0.8$  eV, while the number of points in the distribution of the initial and final wave function is 13 and 20. Figures 3; references 22: 4 Russian, 18 Western.

6508/12379  
CSO: 1841/218

UDC 547.597

alpha-AMINO ACIDS OF ADAMANTANE SERIES Part 2. SYNTHESIS AND ISOMERIC SPLITTING OF 1,3-ADAMANTYLIDINEDIGLYCINE. AMINATION STEREOCHEMISTRY OF alpha-BROMOACIDS OF ADAMANTANE SERIES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 30 Jul 84) pp 1905-1910

[Article by P.A. Krasytskiy, I.G. Semenova, M.I. Novikova, and A.G. Yurchenko, Kiev Polytechnic Institute imeni 50th Anniversary of Great October Socialist Revolution]

[Abstract] 1,3-Adamantylidene diglycide, a "rigid" analog of diaminopimelic acid, can be used in the synthesis of physiologically active compounds, non-naturally occurring polypeptides and as copolymers with other amino acids. The compound was synthesized by alpha-bromination of the corresponding dibasic acid in thionyl chloride, hydrolysis of the resulting bis-acid and amination of the latter product with ammonia in methanol. The isomeric mixture was completely separated into the racemic and meso-forms. Evidently, amination of the alpha-bromo-substituted acids of the adamantane series takes place with the configuration of the asymmetric center being left intact. References 15: 3 Russian, 12 Western.

12765/12379  
CSO: 1841/207

UDC 543.4/5:577.175.14:633.71

IDENTIFICATION OF CYTOKININS FROM TOBACCO PLANTS BY CHROMATOGRAPHIC AND MASS-SPECTROSCOPIC METHOD

Moscow AGROKHIMIYA in Russian No 10, Oct 85 (manuscript received 5 Dec 84)  
pp 117-119

[Article by V.A. Negretskiy, S.P. Verenchikov and V.N. Lozhnikova, Institute of Plant Physiology, USSR Academy of Sciences, Moscow]

[Abstract] Recently, a method was published for isolation and identification of endogenous cytokinins in tobacco plants based on gel filtration, and paper, thin layer and gas chromatographic separation. In the present paper an additional tool is described for identification of cytokinins. It is shown that zeatine and its riboside are present in all tobacco organs studied: leaves, stem bark and roots, the greatest activity of the riboside being found

in the roots; the parent zearine is present to the same extent in roots and in the bark, with lower levels in the leaves. Figures 2; references 15:  
6 Russian, 9 Western.

7813/12379  
CSO: 1841/269

CATALYSIS

DISCOVERY ABOUT CONTROLLING METALS' CATALYTIC ACTIVENESS

Moscow VECHERNYAYA MOSKVA in Russian 26 Dec 85 p 1

[Author] Angov, A.

[Text] A major scientific discovery in the field of catalysis was entered today in the USSR State Register of Discoveries.

The authors of this discovery are V.M. Gryaznov, corresponding member of the USSR Academy of Sciences and head of the chair of physical and colloid chemistry of the University of the Friendship of Peoples imeni Lumumba, and professors V.I. Shimulis and V.D. Yagodovskiy.

"As is known, metals are capable of substantially accelerating the course of many chemical reactions and processes," said Vladimir Mikhaylovich Gryaznov. "But it has long been considered unacceptable to employ metals at high temperatures. The trouble is that when a metal cools slowly, its grains coalesce, and smoothing of its surface takes place. In practice, attempts naturally have been made to avoid this phenomenon, which is called recrystallization.

"If a metal is cooled quickly, however, single atoms of it display surprising activeness, and the speed of the reaction is heightened substantially. It took almost 25 years to demonstrate this.

"The phenomenon that has been discovered makes it possible to expand the applications of metal catalysis substantially. There are good prospects for broad employment of the new method in the chemical and medical industries."

The Moscow scientists' work is protected by several certificates of invention, and patents have been received for it in the United States, Great Britain and France.

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CSO: 1841/280

UDC: 66.095.253.73.547.538.141

## ALKYLATION OF O-XYLENE BY STYRENE ON ALUMINOSILICATE CATALYSTS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 15 Sep 83) pp 111-113

[Article by F.F. Muganlinskiy, S.G. Amirov and V.B. Kakhramanov, Department of Petrochemical Synthesis Technology, Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov]

[Abstract] Results are presented from a study of the reaction of liquid phase alkylation of o-xylene by styrene in the presence of zeolites and commercial aluminosilicate cracking catalysts on a flow-through installation at atmospheric pressure. Of the zeolites studied, types X and Y with bivalent metal cations were active in the reaction of alkylation of o-xylene by styrene, a result of their higher acidity with respect to the sodium forms. Zeolite-containing catalysts AShNTs-3 and TsEOKAR-2 and the decationized form of mordenite with relatively strong acid centers were highly active and selective. Figures 2; references 3 (Russian).

6508/12379  
CSO: 1841/161

UDC: 547.821.412.826.07:542.943.7

## INFLUENCE OF CONTACT TIME ON OXIDATIVE AMMONOLYSIS OF 2,6-LUTIDINE IN PRESENCE OF VANADIUM OXIDE AND VANADIUM-TITANIUM CATALYSTS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMECHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 6 May 84) pp 57-62

[Article by B.V. Suvorov, I.I. Kan, S.V. Berstenev and G.G. Neverdovskiy, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma-Ata]

[Abstract] The influence of contact time of reaction gases with the surface of a catalyst on the course of oxidative ammonolysis of 2,6-lutidine is studied in a flow-through type reactor with a reaction tube equipped with several sequentially placed sampling ports. The composition of the reaction products is determined at various levels in the catalyst layer. A catalyst of fused vanadium pentoxide yields 2-methyl--6-cyanopyridine, 2,-6-bicyanopyridine, 2-cyanopyridine, 2-picoline, pyridine and oxides of carbon. Vanadium oxide catalysts are found to be significantly more active than vanadium-titanium oxide catalysts. Figures 4; references 6 (Russian).

6508/12379  
CSO: 1841/176

UDC: 541.128

STUDY OF MECHANISM OF OXIDATIVE AMMONOLYSIS OF PROPYLENE ON INDIVIDUAL OXIDES  
 $\text{MoO}_3$ ,  $\text{Bi}_2\text{O}_3$  and  $\text{SiO}_2$

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA  
TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 6 Dec 83)  
pp 59-63

[Article by K.N. Gadzhiev, A.K. Khanmamedova, K.Yu. Adzhamov and  
T.G. Alkhazov, Department of Physical Chemistry, Azerbaijan Institute of  
Petroleum and Chemistry imeni M. Azizbekov]

[Abstract] The response method was used to compare catalytic activity in the reaction of oxidative ammonolysis of propylene and the adsorption properties of individual oxides of molybdenum, bismuth and silicon. The response curves of ammonia, propylene,  $\text{CO}_2$ , acrylic acid nitrile and acrolein were used to compare the adsorption and catalytic properties of the oxides. The experimental data indicate that  $\text{MoO}_3$ ,  $\text{Bi}_2\text{O}_3$  and  $\text{SiO}_2$  have different capacities for adsorption and activation of propylene and ammonia. Desorption of propylene and ammonia from the surface of  $\text{MoO}_3$  is comparably rapid, slower from  $\text{Bi}_2\text{O}_3$  and for  $\text{SiO}_2$  desorption of propylene is rapid, of ammonia--slow. The experiments indicate that the surface of  $\text{MoO}_3$  apparently has two types of centers for oxidation of ammonia to  $\text{N}_2$ . Figures 2, references 7: 3 Russian, 4 Western.

6508/12379  
CSO: 1841/161

UDC 547.636.3

CONDENSATION OF DIIODIDES OF MULTINUCLLEAR AROMATIC HYDROCARBONS WITH STYRENE,  
CATALYZED BY PALLADIUM-ON-CHARCOAL

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 10 Jul 84) pp 1947-1950

[Article by V.K. Chaykovskiy, A.N. Novikov and T.A. Sarycheva, Tomsk  
Polytechnic Institute imeni S.M. Kirov]

[Abstract] Aromatic compounds containing phenylethylene groups are used as scintillators for optical bleaching of the working areas of lasers, and styryl derivatives, in which the phenyl group is directly bound to a highly conjugated condensed nucleus, appear promising. In the present work styrene was condensed with diiodides of polycondensed aromatic hydrocarbons in the presence of palladium-on-charcoal in tributylamine. The stereoselectivity of the reaction is a function of the structure of the polycyclic diiodoarene. Step-wise

substitution of the iodine atom is possible in 3,8-diiodofluoroanthene. Seven luminescent styryl-substituted compounds, which appear interesting as organic luminophores, were synthesized. References 10: 6 Russian, 4 Western.

12765/12379  
CSO: 1841/207

UDC 541.49:546.98:546.11

#### FORMATION OF HYDRIDE PALLADIUM COMPLEXES UPON REDUCTION OF Pd(II) BY HYDROGEN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 85 (manuscript received 31 Oct 84) pp 2381-2384

[Article by M.N. Vargaftik, V.P. Zagorodnikov, I.P. Stolyarov, D.I. Kochubei, V.M. Nekipelov, V.M. Mastikhin, V.D. Chinakov, K.I. Zamaraev, I.I. Moiseyev, Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk; Institute of General and Inorganic Chemistry imeni M.S. Kurnakov, USSR Academy of Sciences, Moscow]

[Abstract] A study was made of Pd complexes formed upon processing of a solution of Pd(II) acetate with hydrogen in AcOH containing not over one-half mole of 1,10-phenanthroline or 2,2'-dipyridine per Pd atom at 20°C and 1 atm. H<sub>2</sub>. It was found that when palladium (II) acetate is reduced by hydrogen under the conditions of the experiment, hydride Pd clusters are obtained containing a massive metal-like core with interstitial H atoms. The ligands are bonded to the peripheral Pd atoms, the acetate groups are located in the outer sphere. Figure 1; references 12: 7 Russian, 5 Western.

6508/12379  
CSO: 1841/222

UDC 547.245

#### LIGAND EFFECTS IN NICKEL COMPLEXES ON CATALYTIC ACTIVITY IN HYDROSILYLATION REACTIONS

Leningrad ZHURNAL OБSHCHEY KHIMII in Russian Vol 55, No 10, Oct 85 (manuscript received 6 Mar 85) pp 2323-2328

[Article by N.K. Skvortsov, N.F. Voloshina, N.A. Moldavskaya and V.O. Reykhsfeld]

[Abstract] An analysis was conducted on hydrosilylation of 1-heptene, 1-octene and allylbenzene by methyldichlorosilane catalyzed by Ni(II) complexes, to

determine ligand effects on catalytic activity. Evaluation of  $\text{NiL}_2\text{X}_2$  complexes, where L = acidoligand and X = phosphorus ligand, demonstrated that in the case of phosphonic and phosphinoxide complexes the activity and selectivity was determined by the nature of the phosphorus component. The characteristics of importance were identified as the manner of coordination with the metal, electron donor characteristics, steric considerations and the presence of other groups capable of coordination. The manner of coordination differs markedly for these two types of ligands, with the lower basicity of the phosphoryl entity showing stronger overall electron donor effect on coordination. Spatial factors appear to be less pronounced for the phosphoryl complexes in which the bulky substituents are further removed from the central metal atom. Thus, the tris(trimethylsilylmethylphosphine)oxide complex was one of the most active catalysts. Figures 1; references 20: 1 Czech, 8 Russian, 11 Western.

12172/12379  
CSO: 1841/262

## CHEMICAL INDUSTRY

### MAGNETIC MIXING DEVICE FOR AIRTIGHT REACTORS

Riga SOVETSKAYA LATVIYA in Russian 9 Jan 86 p 1

[Text] Ukrainian scientists have found a use for superpowerful magnets in the chemical, microbiological and pharmaceutical industries.

In collaboration with researchers from Moscow, these scientists have developed a device for mixing substances in hermetically sealed reactors.

"To dissolve sugar faster in a cup of tea we take a spoon and begin to mix it," said Candidate of Technical Sciences I. Sigov. "The mixing process accelerates various reactions and heightens the quality of the end product. But what is to be done if such a reaction must take place in a sealed vessel, under high pressure and at a high temperature? Equipment often breaks down in such conditions. The problem was solved with the aid of a magnetic field. Superpowerful magnetic systems now turn a 'spoon' which mixes the solution in which it is submerged, to carry on the analogy between the reactor and the cup of tea."

This original technical solution radically improves the performance of reactors in industrial conditions.

FTD/SNAP/12379  
CSO: 1841/280

### INDUSTRIAL AUTOMATION EQUIPMENT ASSOCIATION FORMED

Moscow KOMMUNIST in Russian 31 Dec 85 p 2

[Text] A research and production association, "Avtomatika", has been organized in Kirovakan. This association's main specialty is development of automated production-process control systems for such leading branches of the economy as nonferrous metallurgy and the chemical and gas industries.

Test prototypes of automation equipment will be developed and built at the new association, as well as special instruments for automated production-process control systems.

The association was created on the basis of the State Scientific Research Institute for Automation of Production Processes in the Chemical Industry and Nonferrous Metallurgy, and of the experimental plant of the special design bureau "Avtomatika", whose personnel have amassed much experience with development of automated systems for monitoring physical-chemical parameters of natural gas and automation equipment.

FTD/SNAP/12379  
CSO: 1841/280

#### ACCIDENT AT LATVIAN AGRICULTURAL PRODUCTION ASSOCIATION

Moscow SELSKAYA ZHIZN in Russian 18 Sep 85, p 4

[Article by S. Kuznetsov]

[Text] STUChKA (of the Latviyskaya SSR). As early as last Winter, associates of the Rayon Sanitation-Epidemiology Center had pointed out the emergency status of the large-capacity tank for storing ammonia water in the "Latselkhozhimiya" Rayon Production Association. But instead of starting repairs and reinforcing essential construction of the reservoir tank, workers at the Association managed to fill the ammonia water cistern.

And the emergency happened. Ammonia water rushed along reclamation canals toward some beaver dams in the marshy lowland. Only the quick intervention of the Fish Preserve and Sanitation-Epidemiology Center workers prevented the death of the animals and mass poisoning of the fish in the Daugava. But the animals abandoned the struggle for their habitat and left to find new refuges.

For the damage wrought on nature, the Chairman of the Latselkhozhimiya Rayon Association, P. Stubers, his assistant, I. Bundzinsh, and the Head Engineer of the Association, V. Klaikalit, were subjected to fines of 100 rubles each. All the culprits received stiff Party penalties as well.

/12379  
CSO: 1841/295-P

#### CHEMISTRY, PETROLEUM CHEMISTRY, AND PETROLEUM-GAS PROCESSING

Moscow EKONOMICHESKAYA GAZETA in Russian No 1, Jan 86, p 12

[Text] Due to reconstruction, the capacity to produce synthetic ammonia at the Kemerovo Production Association "Azot," mineral fertilizer at the Bereznikovskoye and Grodnenskoye Production Associations "Azot," and sulfuric acid at the Balkhash Mining and Metallurgy Plant and the Samarkand Chemical Plant has increased.

Other starting objectives include new capacities in coking petroleum residues and removing paraffin from diesel and kerosene fractions in the Pavlodara and Kstovo Gorkovskaya Oblasts at the Mybarekskiy and Astrakhanskiy Gas Processing Plants and in producing caustic soda at the Ziminskiy Chemical Plant.

Capacities are growing in the output of chemical fibers and threads, synthetic resins, plastics, and synthetic rubber at the Kamenskoye (in Rostov Oblast) and Mogilev Associations "Khimvolokno," "Polimir" in Novopolotska, the Yaroslavl Production Association "Lakokraska," and the Voronezh and Krasnoyarsk Synthetic Rubber Plants.

The potential to produce tires and rubber-asbestos products is increasing at the Production Association "Nizhnekamskshina" in the Tatar ASSR and at the Belotserkovskoye Production Association. The capacity to manufacture rubberized tapered drive belts at the Belotserkovskiy Plant of Industrial Rubber has risen by 6.7 million relative units.

/12379  
CSO: 1841/295-P

#### FACULTY DEVELOPMENT OF SIBERIAN PETROLEUM RESOURCES

Moscow IZVESTIYA in Russian 14 Jan 86 p 2

[Article by L. Lebitskiy, R. Lynev and Yu. Perepletkin, "Izvestey" Brigade in Western Siberia, Tomsk/Tobolsk]

[Text] For those who do not know or have forgotten, we announce the following: the great Russian chemist Dmitri Ivanovich Mendeleyev was born in Tobolsk. Not so long ago, the townspeople solemnly dedicated a monument to their renowned fellow countryman. His name was bestowed upon an avenue leading from an ancient citadel to a huge building--the Tobolsk Petrochemical Combine which was yesterday a hoary, beautiful oldster but now has reactors and compressors.

In the regional history museum, there are books by D.I. Mendeleyev having to do with petroleum-related matters in Russia and America, along with petroleum test stands, earmarked for Siberian oil and gas. [Here is] a surprising quirk of history: the dreams and schemes of the first Russian petrochemist are becoming a reality in his native land. And, what a reality they are becoming! [They are being realized] in the largest petrochemical enterprise in the world.

Long before the beginning of its construction, controversy raged as to how to make better use of the oil and gas wealth of Siberia. Some argued that: such a building here, beyond the Urals, will cost a pretty penny owing to the high cost of laborers. It would be far simpler, they maintained, to expand enterprises in operation in the European part of the country. The error of [just] such an option was proven to them. The error was that it [the option] allotted to Western Siberia only the role of miner, that of supplier of raw

materials, presupposing a clearly lopsided development. [It would be] far more reasonable to develop the region in an integrated fashion, converting it not only into a principal oil and gas industry but also into a sizeable petrochemical works for the country, one capable of producing large quantities of resin, plastic, synthetic rubber and [surface] covering. Attendant to this option, there was a great number of weighty arguments. But, this option was accepted. To produce a ton of plastic in the European part of the country, 6-8 tons of raw materials and fuel are needed. These are delivered out of Siberia, over thousands of kilometers. The plastic produced [as a consequence] of this is twice as expensive.

But, in Siberia, conditions are better in terms of water, fuel and the choice of a construction site--it is not absolutely necessary to confiscate hectares upon hectares of land under cultivation. According to data from the Institute of Economics and the Organization of Industrial Production of the Siberian Department of the USSR Academy of Sciences, the production costs for a ton of plastic here, in the Tyumen Oblast, is 40%, and a ton of rubber 60%, less than in the European part of the country.

These and other considerations even lay at the foundation of government decisions made with regard to the construction of the two petrochemical giants in Western Siberia--in Tomsk and Tobolsk. In terms of output, the Tobolsk petrochemical combine would exceed the [output of] the largest petrochemical enterprises by 2-3 times. Its productivity of labor was forecast as being twice as large as at the present branch showplace in Nizhnekamsk.

In size, both structures--in Tomsk and Tobolsk--are so large that a single ministry would not suffice [to administer] them. For that reason, the Ministry of the Chemical Industry was entrusted with construction of the Tomsk combine and the Tobolsk [installation] was to be built by the Ministry of the Petrochemical Industry. In 1975, work commenced on the two sites simultaneously. More than a decade has passed. At this point in time, as is known, Western Siberia's share of petroleum, gas and [petroleum] condensate extraction has reached more than half [of the total] for the entire union. But, what about petrochemistry?

"Here, the contribution of Western Siberia to the overall amount even declined by almost half", replies the head of the economic research sector of the above-mentioned Institute of Economics and the Organization of Industrial Production of the Siberian department of the USSR Academy of Sciences, S. Starovoytov.

"How can that be?", we marveled.

"Like this".

In its own time, the Siberian option triumphed in theory--this is true--but in practice, the Ministry of the Petrochemical Industry came up with reprocessing of raw materials from Tyumen, not here on site, but at enterprises in the European sector of the country, for the most part.

That is, in spite of the calculations and the decisions, the simplest option for the Ministry of the Petrochemical Industry struck out on its own course, turning into the major part of the difficulties for the rest.

However, the simplicity of which we are speaking has its own inherent quirks and zigzags. More on that directly below. Now, we'll explain for the sake of those to whom these matters are a novelty. Not only petroleum serves as a raw material for petrochemistry; so does the gas dissolved in it--casing head gas. But, it is not enough to separate it out (this is done in any industry). Plants are needed for making use of it--gasoline plants.

Nevertheless, the Siberian firms in Surgut, Nefteyugansk and other extraction centers are also called oil and gas centers. In fact, their principal duty is the extraction of petroleum. And, for them, casing head gas is just that--a byproduct. It is easier to burn it off than to take the trouble to utilize it.

So, it was burned off.

Only 10 years later, after the first industry began operation in 1975, the first gasoline plant was put into operation at Srednyi Priob. Then, one after another, four more [plants were launched]. Thus, the tenth five-year plan for the complex was a period of "small-scale" chemistry--the precursor of "large-scale" chemistry. Thereafter, at Srednyi Priob, 2/3 of the casing head gas torches were extinguished. Every year, 21.5 billion cubic meters of casing head gas began to be used. Still, ten billion cubic meters are burned off every year. This is quite a bit--exactly as much as was burned off up until the launching of the gasoline plants.

"So as to avert these losses", insisted the general director of the Siberian Oil and Gas Reprocessing Company, V. Tatarenko, "one must step up the construction of planned plants and endow these same remote industries with blocks of small-scale installations for the utilization of casing head gas".

How is this related to petrochemistry in Tobolsk? [It is] directly [related] because "small-scale" chemistry, having divided up casing head gas into "dry" and "aliphatic", delivers the former to the State regional electric power plant. With it, it heats up a number of Siberian plants. The latter--the burnt off "plums"--go to Tobolsk by pipeline.

What are you thinking of doing with it now? Does one get diverse products from it, as planned? No! The tank cars are moved up, filled and slowly transported west of the Urals to other plants. Figuratively speaking, spoonful after spoonful is being hustled past the mouth of the petrochemical giant in Tobolsk. In its own way, it was turned into a raw material storage depot for others. That was accompanied by two [other] circumstances. Firstly, a number of the giant's capacities have not been brought into play in time. The second circumstance was called out in the conclusions of the USSR Government Construction Commission in 1978. This appears improbable; but, the conclusions confirm [the fact] that the raw materials are not enough for the combine.

"How", the reader wonders, "can they not be enough when the [casing head gas] torches are burning, when the tank cars carrying the raw materials go [right] past the combine?"

One way or another, the conclusions of the panel of experts cooled the ardor of the builders and the clients.

That same year, 1978, the Tyumen party oblast' committee of the Siberian Department of the USSR Academy of Sciences and the Council on the Study of Production Forces, attached to the USSR State Plan, called a symposium. Its participants refuted the conclusions of the panel of experts. But, it appears that it was hard for the client--the Ministry of the Petrochemical Industry--to reconcile the "boom" after the "downturn" in production. And, since that time, the only thing that has changed is that: burnt off gas out of Tobolsk "into Europe" stopped being transported by tank car. A pipeline was laid.

But the petrochemists ascertained that it was not possible for them to set up the production of synthetic rubber in the necessary quantities--the capacities of the old enterprises did not permit this. They remembered about Tobolsk where 800 million rubles had already been invested. Prevailing circumstances dictated this.

"Within the ministry, there is no other such area of growth," says the deputy minister, L. Karpenko.

"For this reason, we are attempting to see to it that the builders are on the job".

"Throw the blame on the builders--don't be ridiculous", replied A. Yudayev, an official of the Tobolsk Industrial Construction Company.

"Yes, for 10 years we lagged behind the plans by about a year, failing to use up 81 million rubles. But, all the same, bringing capacities into play was put aside for the entire 10-year plan and longer".

Disregard similar mutual recriminations. In this matter, yes and no are nonessential elements. The main thing is that the client--the Ministry of the Petrochemical Industry--is not visible in a role that is suitable to it, viz., the role of director, organizer of the overall effort.

Now, let's talk about the Tomsk option. Here, as stated above, the main thing is the Ministry of the Chemical Industry. The military consumer society "Plastpolimer", having involved tens of institutes in this matter, had planned on the combine. The "beautiful project"--as it is called--was approved by all the panels of experts and ((2 WDS MISSING IN THE ORIGINAL)), who knew that the site for the combine had been duly selected. Water was sufficient (the river Tom flows nearby) and the oil and gas pipelines are nearby [as well]. The project envisions an installation for in-depth processing of petroleum. It would assure the production of that amount of plastic which is presently being produced in the entire country.

And, the "beautiful project" took shape--we'll say outrightly--satisfactorily --with the complete agreement of the builders and the clients. The combine was well inscribed within the city and blended in well with the forests and the river. Today, a number of its products have already been launched and others are being introduced. But, in this process, as in Tobolsk, the products again aren't being introduced at the level of the petrochemists. Via their initiative, stemming from the project which was approved by their ministry some 3 years ago, the installation for the in-depth processing of petroleum was scrapped. The main institute of the branch of the All-union Scientific Research Institute of Petroleum Processing supplied the bases for that withdrawal: let the new combine buy its ready-made gasoline from the petrochemists and work with it, just like everybody else in the country. As for petroleum reprocessing, there is but one boss in the matter--the Ministry of the Petrochemical Industry.

In practice, this meant that petroleum [going] past Tomsk (in the same manner as "aliphatic" gases going past Tobolsk) had to be rerouted for reprocessing, first in Omsk and Achinsk and from there, gasoline having been produced, taken back to Tomsk in tanker cars. Every year, millions of tons of petroleum [are taken] there and millions of tons of gasoline are brought back.

The question arises: Which panel of experts does one believe--those who founded the project or those who carried out the above-mentioned "dismemberment"?

As with the Tobolsk option, in Tomsk, there arose the question as to a raw materials base. Via the initiative of the USSR State Plan, the Ministry of the Petrochemical Industry and the State Committee for the Provision of Petroleum Products, a single solution to this matter had to be found 3 years ago. No solution was found. An option came to light--send ethane and petroleum condensates from Urengoy and Yamburg to Tomsk. But, again, the predicament was that the gas producers, like the petroleum producers, were not interested in the recovery of associated hydrocarbons. Moreover, technically speaking, the issue was a complex one. For this reason, in the "Tyumen Scientific Research Institute of the State Planning Institute for Gas", they cautioned: before getting down to cases in this matter, one had to get ready for so doing. There is still the point of view whereby a pipeline is to be built for feeding ethane and [petroleum] condensates, not into Tomsk, but back into the European part of the country.

The abundance of approaches (perhaps more correctly, roundabout ways) does not dishearten one as much as the narrowness of each [individual] one of them, trying to view "its own" little piece of the problem and not all of it taken together, from the extraction of raw materials to the production of finished products.

"It is abundantly clear", considers the deputy minister of the chemical industry, Z. Polyakov, "that in terms of imported gasoline, brought in on wheeled transports, the Tomsk combine is not to be enhanced. Whether we'll be given petroleum, ethane and [petroleum] condensates is now finally to be decided.

"On the one hand, the combine has a problem with raw materials; on the other, many billions of cubic meters of casing head gas are being burned off in the region every year.

"The gas condensate riches of a deposit are not being used", argues the Secretary of the Tomsk Oblast party committee, V. Zorkaltsev. "This paradox serves as a basis for a whole series of others. The crux of these [paradoxes] is that oil- and gas-producing Siberia, even having at its disposal modern enterprises, such as those in Tomsk and Tobolsk, continues to supply raw materials and, under better conditions, semi-finished products for other petrochemical enterprises. In return, finished products come back to Siberia. This is not how it should be. Here on site--this matter was broached at a meeting of party-economic activists in Tyumen'--from Siberian raw materials, one should get not only synthetic materials but even tubing and all sorts of [other] products".

This then is integrated development. Unfortunately, for the time being, his idea remains unrealized. Neither petrochemical giant has been completed and their complexes are in a muddle. The question of the responsibility of the Ministry of the Petrochemical Industry remains open.

/12379  
CSO: 1841/285-P

#### PLANNING FOR CHEMICAL INSTALLATIONS DETERIORATING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jan 86 p 1

[Article by Igor Shuvalov, State Scientific Research Institute for Chlorine Industry Planning]

[Abstract] The author states that over the past 10 years, the quality of planning generated at his institute has gone steadily downhill. A plant in Yerevan built many years ago is still not on stream, there are many complaints concerning the work of facilities constructed from plans of his institute in Kalusha and Volgograd. Practically none of the caustic soda and chlorine plants put in operation in that time is working at full power. The major 'disease' from which the institute is suffering is undemandingness, reaching the level of sheer irresponsibility. In his previous job, every worker considered himself a representative of the organization for which plans were being developed, defending their interests at all stages. At his present job, protection of the interests of the ordering organization is not the practice, and in fact, many times, the consumer is not thought of at all. When the author refused to sign plans which were done poorly, he was bypassed, his opinions ignored, and the head of the institute signed the plans.

6508/12379  
CSO: 1841/302

**AFFILIATIONS OF SPECIAL DESIGN BUREAU FOR CHEMICAL ENERGY APPARATUS AND MACHINES**

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Dec 85 p 1

[Article by A. Kirichenko, correspondent, Press Center, Chemical Machine Building Ministry, Novosibirsk]

[Abstract] The Special Design Bureau for Chemical Energy Apparatus and Machines has 'two bosses,' the Ministry of Chemical and Petroleum Machine Building and the Institute of Thermal Physics, Siberian Department, USSR Academy of Sciences. Many organizations in Novosibirsk have similar dual parentage, the network of design organizations here having been created to reinforce the connections between the academic and industrial scientific worlds. Each such design bureau must bring to life the ideas and developments of its academic institute as well as meet the requirements of the industrial research organization with which it is affiliated. Examples of results achieved by the Design Bureau are noted, including a small capacity plasma chemical installation for production of dilute nitric acid, as well as plasma technology devices for use in repairing equipment.

6508/12379  
CSO: 1841/302

UDC: 678.5.003.13

**INCREASING EFFECTIVENESS OF BRIGADE FORM OF ORGANIZATION OF LABOR IN PLASTICS SUB-BRANCH**

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 3-4

[Article by M.G. Ostrogorskiy and A.Ye. Yegorycheva]

[Abstract] In order to increase the effectiveness of the brigade form of organization of labor, a plan was developed in the plastics industry for the creation of combined self-supporting teams with wages based on production results with a labor participation factor applied to each worker. The plan was successfully introduced in 1984 at most plants of the industry. Over 60% of all workers in the industry are members of brigades. The number of specialized brigades has decreased, the number of combined brigades increasing. Increasing the number of workers in a brigade increases competition within it and improves competition among the brigades. Over 79% of workers in the industry work on brigades in which all members receive the same wage; 63% of workers are paid on the basis of results produced. Independently-financed teams require that the expenditure of raw materials, energy and fuel be allocated to the brigade. Brigades represent one form by which the workers participate in the management of production.

6508/12379  
CSO: 1840/252

SIDE PRODUCT AS ADDITIONAL RAW MATERIAL FOR PRODUCTION OF BENZOIC ACID

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 14 Jan 85) pp 72-73

[Article by M.N. Khasanova, M.M. Adakhamov and U.M. Azizov, All-Union Scientific Research Chemical-Technologic Institute of the Medical Industry]

[Abstract] Benzoyleformic acid (preparation A-1), an effective cotton growth stimulant, is obtained at Fergana's "Azot" Production Association by oxidizing ethylbenzene with solutions of potassium permanganate in an alkaline medium. Benzoic acid is produced as a side product. This acid and its sodium salt are effective silage feed preservatives. Benzoic acid can be purified by recrystallization in distilled water with filtration of insolubles and cooling. This yields reagent-grade benzoic acid with a yield of 90%, purity 99.6%. A technological plan has been developed for purification of benzoic acid and the unit is to be introduced at the plant. References 2.

6508/12379  
CSO: 1841/215

EFFICIENT PRODUCTION OF FINE CHEMICALS

Kiev PRAVDA UKRAINY in Russian 7 Jan 86 p 2

[Article by N. Talalay, Cherkassy]

[Abstract] The Cherkassy Plant of Fine Chemical Reagents has repeatedly exceeded its production plans, despite its highly complicated technology and the relatively limited demand for its exotic products. At the present time the plant produces some 670 fine chemical reagents, which it supplies to 750 Soviet and 25 foreign consumers. Discussions with V.V. Bykhov, plant director, and Professor N.G. Lukyanenko, Head of the Department of Bioorganic Chemistry at the Physicochemical Institute imeni A.V. Bogatskiy of the Ukrainian SSR Academy of Sciences, has shown the fine interplay between theoretical and applied chemistry in the design and synthesis of reagents produced at the plant, and the close cooperation and coordination between these two institutions that assure a successful chemical plant. One of the more recent success stories deals with the production of a wide assortment of crown ethers, compounds with unique biological properties and wide application in agriculture. In addition to efficient management of available resources and production plans, special care is also accorded to the needs of the average worker. To that end the plant has provided for greenhouses for year-round availability of vegetables to the workers, as well as for 200 beehives. The health complex at the plant

includes a sauna and rest areas, as well as facilities for rest and recreation on the Black Sea and the Sea of Azov.

12172/12379  
CSO: 1841/314

#### FAULTY EQUIPMENT AND QUALITY CONTROL IN BIOCHEMICAL PLANT

Moscow IZVESTIYA in Russian 9 Jan 86 p 2

[Article by A. Shcherbakov, Izvestiya correspondent, Krasnoyarsk]

[Abstract] Until 1979 the Krasnoyarsk Biochemical Plant was one of the most efficient operations of its kind, with an excellent reputation and a high esprit-de-corps. Around the middle seventies some of the standard and conventional equipment had to be replaced because of age, with a decision made to utilize new reactors and digesters constructed from a titanium alloy. The latter promised a number of advantages, and in view of this the extra cost seemed a reasonable investment. Soon, a litany of problems developed which undercut production and transformed an efficiently run plant into shambles. The new reactors and digesters developed cracks. Subsequent ultrasonic flaw detection revealed other defects which demonstrated that the new equipment was not suitable for the process for which it was designed. A number of ministries and design and research institutes were found to be at fault, stemming from their desire to put something new on the market without adequate testing and pilot studies. Finally, a decision was made to revert to the original equipment with the net result that production is still not up to par and the workers continue to be dispirited. To make matters worse, while other similar plants have now refused to accept the new equipment, it is still being installed at other sites. But this fiasco involves more than just a technological failure, it involves the failure of individuals in position of authority and decision-making to live up to the goals set for them by the Party.

12172/12379  
CSO: 1841/314

## COAL GASIFICATION

UDC 662.74:665.777.4.004

### EFFECTS OF SOLID POLYMERS ON COAL CAKING

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 85 (manuscript received 18 Jan 84) pp 87-92

[Article by V.M. Yegorov, P.M. Kutovoy, V.F. Goncharov, I.P. Neyelov, A.R. Kostochkin, A.F. Strelenko and M.V. Semenenko, Dnepropetrovsk Metallurgical Institute]

[Abstract] Studies on the use of various polymers in isolation and in mixture for improving coal caking have shown that a useful mixture can consist of 80% polyethylene, 10% polystyrene and 10% others (polyvinyl chloride, celluloid, polyamides, etc.). Specific studies with coals G6 and G11 have shown that addition of 1% polymer mixture (0.5 mm grain size) can result in significant caking improvement. In the case of furnace charge with 35-45% G6 a 3% addition of polymeric waste products represented optimal concentration. The effectiveness of plastic addition was predicated on the similarities in the thermal destruction temperatures of the polymers and the plasticity of the coal charge. Addition of the polymers had an adverse effect on caking in the case of coke. Figures 2; references 8 (Russian).

12172/12379  
CSO: 1841/313

UDC 662.75

### COALS AS RAW MATERIAL FOR PRODUCTION OF ENRICHED SOLID, LIQUID AND GASEOUS FUELS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 85 (manuscript received 8 Apr 85) pp 3-9

[Article by I.V. Yeremin and M.N. Zharova, Institute of Fossil Fuels]

[Abstract] An analysis is provided of the various methods used for the evaluation of coal as a raw material for the production of gaseous, solid and

liquid fuels, with the assessment that evaluation of coal for liquid fuel production constitutes one of the more challenging problems. In addition to conventional chemical, physical and petrographic factors, the practice in the USSR is also to determine the degree of coal reduction. The latter parameter, however, is said to be often neglected in the West. For the production of liquid fuels from coal the USSR has promulgated a new standard for coal evaluation, GOST [All-Union State Standard 25543-82] to facilitate proper allocation of the coal resources. A reversible kinetic model involving second order kinetics for hydrogenation has been devised for the transformation of coal into liquid products. On the basis of this model it has been shown that the reactivity of coal in this process depends on the H/C ratio to a significant extent. Technical data for selected coals are summarized in tabular form, with the notation that in the years of the 11th Five Year Plan considerable advances have been made in more rational utilization of available coal resources. Figures 1; references 27: 1 Polish, 16 Russian, 10 Western.

12172/12379  
CSO: 1841/313

COMBUSTION

UDC 541.11.127;54-16+539.2

REGULARITIES OF NONTHERMAL PROPAGATION OF FLAME IN MIXTURES OF SILANE WITH OXYGEN

Moscow KHMICHESKAYA FIZIKA in Russian Vol 4, No 10, Oct 85 (manuscript received 6 Nov 84) pp 1409-1416

[Article by V.V. Azatyan, R.G. Ayvazyan, V.A. Kalkanov, A.G. Merzhanov, S.A. Tsyganov and A.A. Shavard, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Results are presented from a study of the propagation of flame in mixtures of silane and oxygen with and without inhibitors. A method is also described of estimating the effective rate constant of positive interaction of chains. The propagation of flame in mixtures of  $\text{SiH}_4$  and  $\text{O}_2$  diluted with inert gas was studied on a static vacuum installation, the reactor being a thermostatted quartz cylinder 3 cm in diameter and 80 cm long. The maximum temperature of nonthermal propagation of the flame was determined as the initial temperature, above which nonthermal flame propagates in the mixture if artificially initiated in a very small area of the reactor. The limits of spontaneous ignition were determined by allowing the mixture into the thermostatted evacuated reactor. The results measurement of the velocity of nonthermal flame propagation and concentration of chain carriers allow estimation of the rate constant of the nonlinear branching of the chains. Figures 4; references 31: 27 Russian, 4 Western.

6508/12379  
CSO: 1841/218

UDC 536.46

OSCILLATION INSTABILITY OF FLAME AT LIMIT OF DIFFUSION COMBUSTION OF CONDENSED FUEL

Moscow KHMICHESKAYA FIZIKA in Russian Vol 4, No 10, Oct 85 (manuscript received 31 May 84) pp 1423-1426

[Article by V.I. Yeremin and V.M. Nikolayev, All-Union Scientific Research Institute of Fire Prevention, Balashikha]

[Abstract] The purpose of this work was to determine the nature of fluctuations in a flame near the limit. Experiments were performed in a glass cylinder 10 cm in diameter and 50 cm high with a gas flow rate of 1 cm/s. The fuel was hexane, the inside diameter of the quartz burner was 1 cm, wall thickness 0.1 cm. The oxygen concentration in the bypassing flow was decreased from 21 to 15 vol. percent by introducing nitrogen. Flame oscillations were studied by cinematography at 48 frames per second. The results show that as in the isothermal reaction on a heterogeneous surface, the transition mode between diffusion and kinetic areas of the reaction is unstable. Under some conditions an oscillating mode of combustion occurs where the flame propagates in a mixture of nitrogen, oxygen, fuel and the products of its oxidation. The oxidation products are quite numerous even for simple hydrocarbons. Disruption of the stability of the flame is related to the fact that the interaction of the condensed phase of the fuel with the gas-phase zone of the chemical reaction under certain conditions leads to a progressive increase in small perturbations. It is suggested that a gas mixture is formed before the flame expands, containing oxygen of at least stoichiometric concentration, so that the concentration of the mixture corresponds to the lower limit of flame propagation. Figures 2; references 20: 10 Russian, 10 Western.

6508/12379  
CSO: 1841/218

## ELECTROCHEMISTRY

### ELECTROCHEMISTRY DISCOVERY LEADS TO NEW ALLOYS, BETTER BATTERIES

Moscow IZVESTIYA in Russian 30 Nov 85 p 4

[Article by I. Novodvorskij]

[Text] On November 29, 1985, the USSR State Committee on Inventions and Discoveries recorded a discovery made by a group of associates of the USSR Academy of Sciences' Institute of Electrochemistry imeni Frumkin: Professor B. Kabanov, Doctor of Chemical Sciences D. Leykis, and candidates of chemical sciences I. Astakhov, I. Kiseleva and D. Aleksandrova.

Alkali metals, for example sodium, when dissolved in water cannot become deposited on solid metal electrodes placed into such a solution. This fact was thought to be generally recognized. It was thought that if an ion of an alkali metal became deposited on an electrode, turning into an atom, it would immediately be washed away, having entered into a chemical reaction with the water.

The authors of the discovery, however, demonstrated experimentally and explained in theory that in certain conditions, due to defects in the crystalline lattice, atoms of alkali metals become fixed in just these spots. A layer that is a mixture of both metals is the result.

The phenomenon of electrochemical implantation (which is what the authors have named their discovery) has permitted a number of anomalies in electrochemical processes to be explained. Methods have been developed for producing effects on electrodes which make them more 'hospitable' for atoms of alkali metals. Thanks to this, alloys have been obtained at room temperature, including ones which in the past were believed to be impossible to produce. A method of activation of aluminum electrodes which has been developed on the basis of the discovery makes it possible to increase the capacity of electrochemical sources of current.

FTD/SNAP/12379  
CSO: 1841/280

## DISCOVERY ABOUT ELECTROCATALYTIC ACTION OF ENZYMES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Dec 85 p 1

[Excerpt] Yesterday the USSR State Committee on Inventions and Discoveries recorded discovery No. 311. It belongs to the branch of physical-chemical biology which studies mechanisms of enzymatic catalysis and methods of controlling them. The new discovery was made at the Moscow State University and the USSR Academy of Sciences' Institute of Electrochemistry imeni Frumkin. Its authors are I.V. Berezin, corresponding member of the USSR Academy of Sciences; doctors of chemical sciences S.D. Varfolomeyev and M.R. Tarasevich; and candidates of chemical sciences V.A. Bogdanovskaya and A.I. Yaropolov.

The essence of this new discovery of Soviet scientists lies in the fact that the possibility of accelerating electrode reactions with the aid of biological catalysts--enzymes--has been theoretically substantiated and demonstrated experimentally.

Experiments demonstrated that enzymes attached to surfaces of electron conductors or incorporated into the matrix of a conductor can perform the role of catalysts of electrochemical reactions.

Expensive metallic catalysts based on platinum have been used for electrocatalysis. Even the best of them are not active enough to permit the electroreduction of molecular oxygen, on which the speed of many technically important electrochemical processes depends, however. Scientists have now found conditions in which an enzyme is capable of exchanging electrons with a conductor and accomplishing desired bioelectrochemical reactions. A unique capability of the enzymes is retained in the process--increasing the speed of these reactions by millions of times. The phenomenon that has been discovered has been named bioelectrocatalysis.

How did they manage to combine things that appear to be incompatible? Studying the mechanism of enzymatic catalysis and properties of enzymes, the researchers found a way of combining two different reactions which consists in direct transfer of electrons between the active center of an enzyme and an electrode.

This discovery is of great practical importance. Principles of future intensive processes are being worked out in laboratories. Scientists are convinced, for example, that bioelectrocatalysis can lead to profitable production of many needed compounds, including physiologically active ones.

Analytical devices have been designed which make it possible to determine the composition of substances in complex biological systems. This is important for biomedical diagnosis, for example. Also of interest are sensors for monitoring the synthesis of substances in microbiological reactors.

FTD/SNAP/12379  
CSO: 1841/280

INFLUENCE OF VARIOUS GAS ATMOSPHERES ON CONDUCTIVITY OF COMPOUNDS IN THE  
2,3-NAPHTHALOCYANINE SERIES

Moscow KHMICHESKAYA FIZIKA in Russian Vol 4, No 10, Oct 85 (manuscript  
received 9 Oct 84) pp 1327-1331

[Article by V.M. Mokshin and O.A. Postnikova, Scientific Research Institute of  
Organic Intermediates and Dyes, Moscow]

[Abstract] The purpose of this work was to study the electrophysical characteristics such as dark conductivity, activation energy of conductivity in the area of natural conductivity, and position of acceptor level plus relaxation time of electroconductivity of 2,3-naphthalocyanine series compounds under the influence of atmospheres of air, pure O<sub>2</sub> and NO<sub>2</sub>. The specimens studied were obtained by vacuum sublimation of preliminarily purified complexes of zinc 2,3-naphthalocyanine, its tetra-tert-butyl substituted analog. Air resulted in an increase in conductivity and a significant change in the conductivity of the sublimated films. A determination of the number of gas molecules in the volume of the film after equilibrium diffusion flow was established indicated that oxygen cannot be responsible for the diffusion component of the kinetic curve measured. The studies thus showed that the interaction of a sublimated film with air leads to a complex range of processes. Nitrogen dioxide is apparently the component of the air which has the dominating influence on the behavior of conductivity of the film.

Figures 3; references 13: 9 Russian, 4 Western.

6508/12379  
CSO: 1841/218

QUANTUM CHEMICAL MODELS OF STRUCTURE OF Mg-PORPHYRINS AND THEIR WATER COMPLEXES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA  
TEKHNOLOGIYA in Russian Vol 28, No 10, Oct 85 (manuscript received 17 Jan 85)  
pp 3-12

[Article by V.M. Mamayev, I.P. Gloriozov and V.V. Orlov, Department of Organic  
Chemistry, Moscow State University imeni M.V. Lomonosov]

[Abstract] The highly efficient process of photosynthesis encourages attempts to create molecular systems similar to chlorophyll which are excited by solar energy. For building a model of a photosynthetic apparatus on the molecular level, information about the geometric and electronic structure and energy characteristics of Mg-porphyrins, Mg bacteriochlorins, and their extra-complexes is necessary. Therefore, the structural measurements and quantum chemical calculations of the geometric and electronic structure of Mg-porphyrins and their water complexes have been studied in this article. A

method for choosing the fundamental atomic orbital of elements in period III based on optimization of the exponent value for the 3d orbital is proposed. The results of calculating the spatial structures of Mg-chlorin, Mg-bacteriochlorin, and their pentacoordinated water complexes by the approximation method agree well with the structural measurements. The structures of the hexacoordinated Mg-chlorin and Mg-bacteriochlorin water complexes are predicted. The coordinating Mg-macrocyclic bond is covalent in nature and is formed by the interaction of Mg with the N atoms and CN-carbons of the macrocycle. The bond lengths and bond energies of these molecules are also determined. Results show that active participation of the Mg 3d orbital in the formation of coordinating bonds has important significance for building models of photosynthetic systems since the efficiency of the process of photosensitive distribution of charge is achieved by means of a special organization of intermolecular interaction.

/12379

CSO: 1841-250-P

### $\text{Li}_2\text{O} - \text{ZnO(MgO)} - \text{SnO}_2$ SYSTEMS

Moscow ZHURNAL NEORGANICHESKOY KHTMII in Russian Vol 30, No 11, Nov 85  
(manuscript received 23 Apr 84), pp 2922-2925

[Article by N.G. Chaban, N.V. Porotnikov, L.N. Margolin and K.I. Petrov, Moscow Institute of Thin-Layer Chemical Technology imeni M.V. Lomonosov]

[Abstract] The goal of this article was to obtain new types of solid electrolytes based on oxides which are able to conduct Li ions. On the basis of X-ray powder identification, the structural type and parameters of elemental cells are studied, and the electrophysical properties of the compounds  $\text{Li}_4\text{M}_3\text{Sn}_5\text{O}_{15}$  (where M = Zn or Mg),  $\text{LiMg}_{1.5}\text{Sn}_{0.5}\text{O}_3$ , and  $\text{Li}_4\text{Mg}_2\text{SnO}_6$  (produced in  $\text{Li}_2\text{O} - \text{ZnO} - \text{SnO}_2$  and  $\text{Li}_2\text{O} - \text{MgO} - \text{SnO}_2$  systems) are studied. The vibrational spectra of complex oxides are investigated by drawing on known  ${}^6\text{Li} \rightarrow {}^7\text{Li}$  isotope substitutions, showing that a correlation exists between the structure of coordinated lithium polyhedrons and the level of ion conductivity of the compounds.

/12379

CSO: 1841/281-P

## EXPLOSIVES AND EXPLOSIONS

UDC: (541.18.052.182:669):537.528

### DISPERSION OF METALS BY ELECTRICAL EXPLOSION OF CONDUCTORS IN LIQUIDS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 5, Sep-Oct 85 (manuscript received 19 Jun 84) pp 963-967

[Article by M.M. Martynyuk and A.K. Al-Nimr, University of Friendship of Peoples imeni P. Lumumba, Moscow]

[Abstract] In order to illustrate the possibility of dispersion of metal by electrical explosion of conductors in liquid to produce metal-colloid solutions and very finely dispersed metal powders, assuring explosive boiling of the metal with subsequent homogeneous condensation of the vapor phase, a study was made of the p-T diagram of metal states in the high temperature area. In the process of electrical explosion of a conductor at heating current densities of  $10^6$ - $10^7$  A/cm<sup>2</sup>, dispersion of the metal basically occurs by local foci of explosive boiling of the metal. The liquid dispersed phase is partially evaporated. The dense metal vapor formed rapidly expands and becomes significantly supersaturated. In the process of condensation of the vapor, finely dispersed metal powder is formed. Dispersion of metals by electric explosion of conductors in a vacuum is not effective, since heating of the conductor is hindered by the shunting discharge along its surface. Explosion of a conductor in a gas such as argon can achieve supersaturation of the metal vapor and produce small particles, but the particles then coagulate with each other. The electric explosion of conductors in liquids prevents this coagulation. Figures 4; references 3: 2 Russian, 1 Western.

6508/12379  
CSO: 1841/163

## FERTILIZERS

### PHOSPHORITE RESOURCES NEGLECTED

Moscow SELSKAYA ZHIZN in Russian, 3 Dec 85 p 2

[Article by R. Budrina, Special Correspondent]

[Abstract] There are rich deposits of phosphorite in Chelyabinsk Oblast, lying virtually on the surface and ready to be extracted. Plans had been drawn up for a phosphorite plant to be constructed in 1972. However, the plant has never been constructed, the phosphorite hills support pig farms and dachas. The five million tons of phosphorites lying on the surface of Kulikov Mountain could result in the production of 35 million tons of flour if the Ministry for Production of Mineral Fertilizer would motivate itself to construct a plant here. The State plan for development of the USSR, 1982-2000 should include a special section on measures for mining of local phosphate ore and a utilization to intensify agricultural production.

6508/12379  
CSO: 1841/302

UDC 631.811

### SOIL ETHYLENE AS REGULATOR OF PLANT GROWTH

Moscow DOKLADY VSESOYUZNOY ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI AKADEMII SELSKOKHOZYAYSTVENNYKH NAUK IMENI V.I. LENINA in Russian No 11, Nov 85 (manuscript received 19 Dec 84) pp 6-9

[Article by G.S. Muromtsev, academician of All Union Academy of Agricultural Sciences imeni Lenin, S.V. Letunova, I.G. Beresh, S.A. Alekseyeva and L.Yu. Rakitin, All Union Scientific Research Institute of Applied Molecular Biology and Genetics]

[Abstract] Endogenous plant growth regulator ethylene can be formed in soil during microbiological transformation of organic substances. Formation of ethylene on turf--podzolic, heavily agrillaceous cultured soil of the non-chernozem zone in the RSFSR was studied by treating various agricultural specimens with lime, mineral, organic and trace element fertilizers. It was

shown that ethylene content in such soils could vary from 0.002 to 2.9  $\mu\text{l/l}$  of soil air, changing from month to month during the vegetative period. Ethylene formation appeared to be a function of the types and quantities of fertilizers used. It was shown to be possible to regulate ethylene formation in soil and to use it as a regulator of plant developments. Figures 3; references 10: 3 Russian, 7 Western.

7813/12379  
CSO: 1841/258

UDC 541.123.3+631.049

#### INFLUENCE OF COBALT TRACE ELEMENT ON PHYSICAL-MECHANICAL PROPERTIES OF CARBAMIDE SOLUTION

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 7 Jul 84) pp 69-70

[Article by Kh. Rasulova, M.A. Mukhamedzhanov and L.S. Rustamova, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] A study was made of the physical and chemical properties of solutions in the system  $\text{CO}(\text{NH}_2)_2-\text{CoSO}_4-\text{H}_2\text{O}$  under conditions similar to the production conditions of fertilizer. Density, viscosity and conductivity of the carbamide solutions with cobalt sulphate were studied at 50, 60 and 70°C. Increasing the quantity of additive increased the viscosity of the solutions. Increasing temperature decreased viscosity. Increasing the quantity of additive from 1 to 10% increased density slightly. Conductivity was increased by an increase in temperature and concentration of additive. Figures 3.

6508/12379  
CSO: 1841/215

UDC 661.845

#### INTERACTION OF COPPER OXIDE WITH AMMONIUM PHOSPHATES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 24 Oct 84) pp 43-45

[Article by Z. Turayev, V.K. Khakimova and S. Tukhtayev, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] A study was made of the behavior of copper oxide in ammophos pulp produced by neutralizing phosphoric acid 25-30% (as  $\text{P}_2\text{O}_5$ ) to pH 4-5 with

ammonia. Introduction of copper oxide and neutralization of the mixture with gaseous ammonia causes precipitation of copper hydrophosphate, followed by metal ammonium phosphate. Copper hydrophosphate and copper ammonium phosphate were formed. Figures 2; references 4 (Russian).

6508/12379  
CSO: 1841/215

UDC 631.893.12

LIQUID COMPLEX FERTILIZERS BASED ON NEUTRALIZATION OF SULFOPOLYPHOSPHORIC ACIDS WITH AMMONIA

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 9 Apr 84) pp 39-42

[Article by Sh.S. Namazov, A.U. Erkayev and S.M. Arifdzhanov, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] Liquid nitrogen-phosphorus fertilizers were used by neutralizing sulfopolyphosphoric acids with gaseous ammonia. The ratio of sulfopolyphosphoric acid (SPPA) to water and pH was found to influence the quality of the liquid fertilizer produced. The aqueous SPPA solutions were neutralized by a continuous method in a glass reactor equipped with a blade stirrer and a water thermostat. Liquid fertilizers obtained with  $\text{SPPA:H}_2\text{O}=1:1$ , pH 5, 6 and 7 were stable upon long-term storage, producing no sediment. Other ratios did produce sediment. The fertilizer is a transparent, heavy liquid with relatively low crystallization point. References 9 (Russian).

6508/12379  
CSO: 1841/215

**FREE RADICALS**

**UDC 541.515:542.91:546.811:547.567**

**FREE RADICALS WITH FOUR- AND SIX-COORDINATED TIN AND ASYMMETRICAL PYROCATECHIN LIGANDS**

**Moscow IZVESTIYA ADAKEMII NAUK SSSR: SERIYA KHIMICHESKAYA** in Russian No 10, Oct 85 (manuscript received 28 May 84) pp 2211-2219

[Article by A.I. Prokofyev, Z.K. Kasymbekova, N.N. Bubnov, S.P. Solodovnikov and M.I. Kabachnik, Institute of Hetero-Organic Compounds, imeni A.N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] A study was made of the interaction of Sn with o-benzoquinones of varying structure and the influence of structural factors on the spectral parameters of the particles formed was traced. EPR studies of biradicals obtained by interaction of metallic tin with various substituted o-benzoquinones and anion radicals generated by reduction in a sodium mirror were undertaken. The temperature evolution of the spectral picture of the anion radicals produced indicates the presence of two conformations differing in mutual position of the free-radical ligand relative to the central Sn atom. Figures 5; references 7 (Russian).

6508/12379  
CSO: 1841/222

**UDC 547.124/547.569**

**THEORETICAL STUDY OF INFLUENCE OF SUBSTITUENTS ON REACTIVITY OF FREE RADICALS.**  
**Part 2. DIMERIZATION OF THIOPHENYL RADICALS**

**Leningrad ZHURNAL ORGANICHESKOY KHIMII** in Russian Vol 21, No 9, Sep 85 (manuscript received 11 Jun 84) pp 1832-1834

[Article by A.M. Nesterenko, A.S. Tarasevich and O.M. Polumbrik, Institute of Organic Chemistry, UkrSSR Academy of Sciences, Kiev]

[Abstract] Quantum chemical study of the effects of substituents on the stability of organic free radicals makes it possible to predict the reactivity

of these compounds during various conversions. In the present work, quantum chemical data were obtained on the structure of thiophenyl radicals and on their reactivity during dimerization. Such data are of interest both from the standpoint of the mechanism of dehydrogenation of thiophenols with free radicals, and the delocalization of spin density in sulfur compounds. It was concluded that both donor and acceptor type substituents enhance radical stability and inhibit formation of disulfides. References 12: 10 Russian, 2 Western.

12765/12379  
CSO: 1841/207

#### APPLICATIONS FOR NITROXYL RADICALS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian, 31 Dec 85, p 2

[Article by N. Ilinskaya]

[Abstract] An interview with Eduard Grigorevich Rozantsev, doctor of chemical sciences, touches upon nitroxyl radicals, a new class of substances capable of delivering medication directly to injured organs. Nitroxyls have become working fluids for lasers, inexpensive radiation indicators and precision tools for genetic engineering. Examples of ways in which nitroxyl radicals can assist in the search for oil, analysis of the quality of diamonds and elsewhere in industry are briefly mentioned.

6508/12379  
CSO: 1844/302

## INORGANIC COMPOUNDS

### WORK ON SELF-PROPAGATING HIGH-TEMPERATURE FUSION TECHNOLOGY

Moscow KOMMUNIST in Russian 31 Dec 85 p 2

[Abstract] The authors discuss the technology of self-propagating high-temperature fusion and its applications, and they comment on progress in introducing the technology.

The authors recall that discoveries made in 1967 at the USSR Academy of Sciences' Institute of Chemical Physics provided the basis for development of principles of self-propagating high-temperature fusion, as well as methods for the control of processes employing it. Basic and applied research in this field is being organized and coordinated by the USSR State Committee for Science and Technology's scientific council on the problem "Theory and Practice of Self-Propagating High-Temperature Fusion Processes".

The authors relate that facilities for producing a number of valuable ceramic powders by the new method have been put into operation since 1981, in line with a nationwide scientific-technical program. These facilities are located in Kirovakan, Baku, Zaporozhye, Makeyevka and other cities. The introduction of self-propagating high-temperature fusion processes has already yielded an economic benefit of more than 150 million rubles, it is claimed. Nitrided ferrovanadium and titanium carbide are now being produced by such processes. This carbide is the main component of two new brands of abrasive paste, "KT" and "KTIOL", which have been put into industrial production.

Particular attention is devoted to the organization and results of work in this field which has been done in the Armenian republic since 1972. The authors relate that an efficient process for obtaining metal hydrides capable of storing hydrogen has been developed on the basis of self-propagating high-temperature fusion at the Armenian Academy of Sciences' Institute of Chemical Physics. A special design-and-technological bureau of refractory materials at this institute has done much to promote products of the new technology. Its first industrial utilization reportedly took place at the Kirovakan High-Temperature Heater Plant, where a process for obtaining molybdenum disilicide was mastered for the first time. Original processes for producing silicon nitride and carbide and a number of composite materials, using local rocks as raw materials, have been proposed at the "Rock and Silicates" Research and Production Association.

In conclusion, the authors call upon interested ministries and industrial enterprises for assistance in expediting the introduction of the latest fusion processes developed at the Armenian academy's chemical-physics institute and elsewhere.

PTD/SNAP/12379  
CSO: 1841/280

UDC 541.64.183:546.273

**THERMODYNAMIC ANALYSIS OF MONOMERIC GAS PHASE COMPOSITIONS IN HETERODIFFUSE SYNTHESIS OF POLYPHOSPHORUS- AND POLYBORONHETEROXANES**

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 84 (manuscript received 25 Mar 85) pp 2157-2161

[Article by V.V. Zavyalov, B.P. Tarasevich, O.S. Sirotkin and M.Yu. Khitrov, Kazan Institute of Chemical Technology imeni S.M. Kirov]

**[Abstract]** Thermodynamic analysis was conducted on monomeric gas phases formed on vaporization of 87%  $H_3PO_4$  (P-O-H system) and on reaction of 7.5 wt%  $B_2O_3$  and 92.5 wt%  $H_2O$  (B-O-H) in the synthesis of polyphosphorus- and polyboronheteroxanes. In the former case the gas phase corresponds to the monomeric form  $H_2O-P_4O_{10}$  within the temperature interval (973-1473 K) usually employed in the synthesis of polyphosphorusheteroxanes. Analysis of  $B_2O_3-H_2O$  system demonstrated that at 1350-1500 K the gas phase consisted essentially of  $H_2O$  and  $HBO_2$ , at 1200-1350 K of  $H_2O$ ,  $HBO_2$ ,  $H_3BO_3$ , and  $H_3B_3O_6$ , and at temperatures below 1200 K of water,  $H_2BO_3$  and  $H_3B_3O_6$ . These observations support earlier assumptions that polymers can be synthesized by polycondensation of  $B(OH)_3$  and  $B_3O_3(OH)_3$  and opening of multiple HO-B=O bonds. Figures 2; references 14: 10 Russian, 1 Czech, 3 Western.

12172/12379  
CSO: 1841/262

**MULTIFACETED CHEMISTRY**

Moscow KRASNAYA ZVEZDA in Russian 14 Dec 85 p 2

[Article by A. Gusev, engineer]

**[Abstract]** It is hard to underestimate the contributions that chemistry makes to our wellbeing. A variety of new products are appearing daily, such as ethyl silicate-40 which acts as a bonding agent and makes possible the molding of a

variety of plastic products with unique shapes. Other chemicals have been devised that act to preserve wood, others represent novel and biodegradable herbicides and pesticides with wide application in agriculture. Still others function as growth regulators in plants, and some enhance the effectiveness of standard fertilizers. It is no wonder that the Party holds chemistry in such high regard, and encourages its further development in the interests of the Soviet people.

12172/12379  
CSO: 1841/314

UDC 666.3.004.8

#### USE OF SLIME IN PRODUCTION OF TILES

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 18 Jan 85) pp 51-55

[Article by A.P. Irkakhodzhayeva and M.T. Mukhamedzhanova, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] Ceramic tiles can be manufactured using slime from wastes produced at electric power plants, coal mines, metallurgical, chemical, and other plants. The slime produced as waste in the production of aluminosilicate catalyst can be used as a substitute for pegmatite in the production of ceramic products. Slime specimens were found to contain 54.72-84.13%  $\text{SiO}_2$  and 9.75-13.42%  $\text{Fe}_2\text{O}_3$ , making it unnecessary to add quartz components to the ceramic mass. Partial replacement of pegmatite by slime increased mechanical strength and decreased water absorption with increasing roasting temperature.  
Figures 3; references 2 (Russian).

6508/12379  
CSO: 1841/215

ION EXCHANGE PHENOMENA

UDC: 542.61

ANION-EXCHANGE EXTRACTION OF ACETATE COMPLEXES OF LEAD (II) BY  
TRINONYLOCTADECYLAMMONIUM SALTS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA  
TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 26 Jul 83)  
pp 44-46

[Article by A.R. Tsyganov, V.I. Kal and M.S. Korobova, Department of Organic  
and General Chemistry, Belorussian Agricultural Academy]

[Abstract] A method of study of extraction equilibria based on the use of monoacid dyes was used to study anionic-exchange extraction of lead acetate complexes by trinonyloctadecylammonium salts. The intermediate ion used was  $\alpha$ -dinitrophenol. The thermodynamic exchange constants of the acetate complexes on a number of mineral ions are presented in tabular form. Lead is extracted as a singly charged anionic complex with high affinity to a toluene solution of trinonyloctadecylammonium in acetate form. Figure 1; references 8 (Russian).

6508/12379  
CSO: 1841/161

## NITROGEN COMPOUNDS

UDC 547.245'246'258.11

### REACTION OF $\beta$ -HYDROXYETHYLUREA WITH ORGANOTIN, -SILICON AND -GERMANIUM COMPOUNDS

Leningrad ZHURNAL OБSHCHEY KHIМII in Russian Vol 55, No 10 Oct 85 (manuscript received 15 Dec 85) pp 2344-2348

[Article by I.A. Vostokov, A.S. Gordetsov and S.Ye. Skobeleva, State Scientific Research and Planning Institute of the Nitrogen Industry and Organic Synthesis Products, Dzerzhinsk Branch]

**[Abstract]** In order to further expand available information on silylated ureas, studies were conducted on the reaction of  $\beta$ -hydroxyethylurea with hexamethyldisilazanes or hexabutyldistannoxane to form the corresponding mono- or disubstituted heteroorganic ureas. Reaction of  $\beta$ -hydroxyethylurea (I) with hexamethyldisilazane (2:1) at 155°C for 2 h resulted in the synthesis of  $\beta$ -(trimethylsiloxyethyl)urea (II). Reaction of I with hexamethyldisilazane at 120-154°C with 3 drops of sulfuric acid led to the formation of N-( $\beta$ -trimethylsiloxyethyl)-N'-(trimethylsilyl)urea, while reaction with hexabutyl-distannoxane (1:1) at 160-190°C led to N-( $\beta$ -tributylstannyloxyethyl)-N'-(tributylstannyl)urea. In analogous manner reaction of II with hexabutyl-distannoxane led to N-( $\beta$ -trimethylsiloxyethyl)-N'-(tributylstannyl)urea, and with dibutylstannoxane to bis[ ( $\beta$ -trimethylsiloxyethyl)carbamido]--dibutylstannane. N-( $\beta$ -triethylgermyloxyethyl)urea was prepared by the reaction of II with hexaethylidigermoxane at 155-160°C for 1 h. References 7: 5 Russian, 2 Western.

12172/12379  
CSO: 1841/262

UDC 542.91:541.515:547.781.5-34

CONVERSION OF 3-IMIDAZOLINE-3-OXIDE NITROXIDES INTO NITRONYL NITROXYL RADICALS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 10, Oct 85 (manuscript received 2 Jul 84) pp 2342-2351

[Article by I.A. Grigorev, G.I. Shchukin, V.V. Khratsov, L.M. Vainer, V.F. Starichenko and L.B. Volodarskiy, Novosibirsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences; Institute of Chemical Kinetics and Combustion, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] Continuing studies of the influence of pH on EPR spectra of nitroxyl radicals, the spectra of two radicals containing an OH group in position two of the heterocycle were obtained. It was assumed that deprotonation of the OH group might result in changes in the values of  $a_{\text{N}}^1$  and G factor as has been observed previously in other radicals. However, at pH over 12, the EPR spectra of aqueous solutions of the radicals undergo irreversible changes from the triplet state to more complex multiplet states similar to the spectra of nitronyl nitroxyl radicals. It is concluded that 1-oxy- or 1-oxyl-3-imidazoline-3-oxides with the acyl, oxyalkyl or oxime groups or atoms of hydrogen at position two of the heterocycle are oxidized in the presence of nucleophiles by intermediate formation of 4H-imidazol-di-N-oxides to nitronyl nitroxyl radicals. A new series of stable nitronyl nitroxyl radicals is obtained with a fundamental group at position four. Based on measurements of  $pK_a$  of the OH- and NH<sub>2</sub>- groups in 4-oxy- and 4-amino-5,5-dimethyl-4-phenyl-3-imidazoline-3-oxide-1-oxyls by EPR spectroscopy, the electron influence of nitronyl nitroxyl groups was estimated. Figures 5; references 16: 6 Russian, 10 Western.

6508/12379  
CSO: 1841/222

UDC 547.82

NITRILE CYCLIZATION REACTIONS Part 17. METHODS OF PREPARATION AND MASS SPECTROSCOPIC STUDY OF 4,6-DIARYL-3-CYANO-2(1H)-PYRIDINETHIONES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85 (manuscript received 6 Aug 84) pp 1963-1968

[Article by V.K. Promonenkov, A.M. Shestopalov, Yu.A. Shararin, V.P. Litvinov, L.A. Rodinovskaya, B.M. Zolotarev, V.D. Sokovykh, B.V. Rozynov and Ya.Ya. Krymskiy, Voroshilovgrad State Pedagogic Institute imeni T.G. Shevchenko]

[Abstract] Substituted 3-cyano-2(1H)-pyridinethiones may be used as intermediates for making dyestuffs, antioxidants, physiologically active

substances, pesticides and products of fine organic synthesis. However, all known methods of synthesis are good for only some one particular series and not for all. In the present work a study was made of the reactions of 3-aryl-2-aryl- and 3-aryl-2-aryl-1-bromo-1,1-dicyanopropane with sodium and morpholinium hydrosulfides, thiourea, arylidenecyanothioacetamides and thioamides of 3-aryl-2,4,4-tricyano-3-butanoic acid with acetophenone and 1-(1-piperidino)-1-phenylethylene, as well as monothiodibenzoylmethane and 1,3-diphenyl-1-(1-piperidino)-1-propene-3-one with cyanatothioacetate, resulting in 4,6-diaryl-3-cyano-2(1H)-pyridinethiones. Use of substituted cyanothioacetates appears to be most promising. Mass spectrometry of the resulting thiones shows that decomposition of molecular ions involves chiefly the elimination of H, HS and CS to form thio- and pyridine-linked cations and the corresponding pyrrole cation-radical. References 27: 10 Russian, 17 Western.

12765/12379  
CSO: 1841/207

## ORGANOMETALLIC COMPOUNDS

### SYNTHESIS OF MANGANESE (II) DICYSTEINATE AND OXIDATION OF COORDINATED CYSTEINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 30, No 11, Nov 85  
(manuscript received 10 Apr 84), pp 2805-2808

[Article by G.D. Zegzhda, T.V. Zegzhda, I.G. Vinichenko, V.I. Shishlevskaya and N.Yu. Ryzhkova, Dnepropetrovski State University; Dnepropetrovsk Mineral Institute]

**[Abstract]** Due to the active participation of Mn ions in biological systems, an obvious interest lies in studying their reactions with bioligands, essential sites around which thioaminoacids are located. The goal of this article was to study the possibility of obtaining and investigating properties of individual Mn (II) bonds with cysteine. Mn appears to be strongly bonded to the oxidized ligand. In the reaction of Mn (II) with cysteine in aqueous solution at pH 8,  $Mn^{2+}(C_3H_6O_2NS)_2$  compounds are produced. ESR spectra of the complex correspond to  $Mn^{2+}$ . According to IR spectroscopy data, the cysteine coordination occurs by means of amino and carboxyl groups. It is found that during synthesis, oxidation of the cysteine mercaptan groups occurs with the formation of a disulfide cross-link between individual molecules of the complex. The degree of cysteine transformation into cystine approaches 60% during the experiment.

/12379  
CSO: 1841/281-P

### PHOTOCATALYTIC SYSTEM BASED ON AQUEOUS-ALCOHOL SOLUTIONS OF ALKYLIRON(III)-BIS (SALICYLALDEHYDE) ETHYLENEDIAMINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 30, No 11, Nov 85  
(manuscript received 4 Jul 84), pp 2861-2865

[Article by V.N. Aleynikova and G.A. Shagisyltanova, Leningrad State Pedagogic Institute imeni A.I. Gertsen]

**[Abstract]** It had been shown that pentacoordinated complexes consisting of  $[RCo^{III}Salen]$  and  $[PCo^{III}Bae]$ , where R = the alkyl groups  $CH_3$ ,  $C_2H_5$ , and  $\underline{C}_3H_7$ ; Salen = bis (salicylaldehyde) ethylenediamine, and Bae = bis (acetylacetone)

ethylenediamine, are convenient models for studying the mechanism of the photochemical formation of hydrogen. In this connection and with the goal of studying the reaction capability of nd-complexes further, alkyl-Rh (III) compounds are synthesized. The Rhodium (III) complexes [RRh<sup>III</sup> Salen H<sub>2</sub>O] and [RRh<sup>III</sup> Salen] are synthesized and characterized. The photolysis of [C<sub>2</sub>H<sub>5</sub>Rh<sup>III</sup> Salen] in CH<sub>3</sub>OH, C<sub>2</sub>H<sub>5</sub>OH, CHCl<sub>3</sub>, 1-C<sub>3</sub>H<sub>7</sub>OH, aqueous-alcohol solutions, and C<sub>6</sub>H<sub>6</sub> at T=298.77 degrees K is studied.

/12379

CSO: 1841/281-P

UDC 547.246

SYNTHESIS, CHARACTERISTICS AND <sup>1</sup>H AND <sup>13</sup>C NMR SPECTRA OF FUNCTIONAL DERIVATIVES OF 1-ADAMANTYLGERMANIUM

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 4 Apr 85) pp 2333-2338

[Article by O.N. Chernysheva, T.K. Gar, V.F. Kisim and V.F. Mironov, State Scientific Research Institute of the Chemistry and Technology of Heteroorganic Compounds, Moscow]

[Abstract] Previously synthesized 1-adamantylgermanium (I) [Gar, TK, et al., Zh. Obshchey Khim., 55(5): 1057-1063, 1985] was used as the starting reagent for the synthesis of a variety of functional derivatives. A series of esters were synthesized by the addition of I to the multiple bonds of acrylic acid, acrylates, and methacrylates, which led to a number of carbofunctional derivatives possessing the 1-AdGeMe group. The latter consisted of acids, the corresponding salts and hydroxamic acid. Under the conditions tested, I failed to react with allylisocyanate, trimethylsilylallylamine, and trimethylsilyl vinyl acetate. Yields, melting or boiling points, empirical formulas and <sup>1</sup>H and <sup>13</sup>C NMR data of the derivatives are summarized in tabular form. References 7: 6 Russian, 1 Western.

12172/12379

CSO: 1841/262

UDC 547.26'178

WO<sub>2</sub>(OR)<sub>2</sub>-TYPE TUNGSTEN ALCOHOLATES: ALCOHOLATE POLYMERISM

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 21 Dec 84) pp 2353-2358

[Article by S.I. Kucheyko, N.Ya. Turova and O.M. Soloveychik, Moscow State University imeni M.V. Lomonosov]

[Abstract] WO<sub>2</sub>(OR)<sub>2</sub>-type alcoholates were synthesized by the reaction of solid WO<sub>2</sub>Cl<sub>2</sub> with NaOR in alcohol at 20°C, where R = Me, Et, or i-Pr. These alcoholates are vitreous substances lacking color, readily hydrolyzable in air and highly soluble in acetonitrile and aromatic hydrocarbons. X-ray studies indicate an amorphous substance with only one maximum with an interplanar distance of ca. 11 Å, that does not melt but decomposes at 180-240°C. forming a blue product. Mass spectra obtained at 260°C contain only one ion--WO<sub>2</sub><sup>+</sup>. In alcohol WO<sub>2</sub>(OR)<sub>2</sub> undergoes disproportionation with a trend showing the following sequence in terms of R: Me < Et << i-Pr. Analysis of WO<sub>2</sub>(OEt)<sub>2</sub> samples by IR spectroscopy indicated that aging involves polymerization with the formation of oxo bridges. Irradiation of the alcoholates with UV light results in the formation of blue color, ascribed to reduction with the formation of W(V), a process which is reversible in the dark. Reversal was ascribed to the effects of oxygen, with the dark rate constant for WO<sub>2</sub>(OEt)<sub>2</sub> calculated at 2.64 × 10<sup>4</sup> moles<sup>-1</sup> · min<sup>-1</sup>. Figures 2; references 15: 5 Russian, 10 Western.

12172/12379  
CSO: 1841/262

UDC 541.49+668.819.553

PORPHYRAZINES AND PROTONIZATION BY WATER

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 27 Dec 83) pp 2402-2404

[Article by A.S. Akopov, Ivanovo Institute of Chemical Technology]

[Abstract] A cursory literature review of the electronic spectra of some porphyrazine-metal complexes has led to the conclusion that in CuPc complexes the copper ion shows both σ and π -effects of coordination. Furthermore, the π-effect exceeds the σ -effect, and diminishes in substituted phthalocyanine-copper complexes and its polymeric and heteroanalogs. Zinc phthalocyanine complexes (ZnPcR<sub>4</sub>; R = substituent on benzene ring of the macrocycle) in water-saturated nitrobenzene form associates. Electronic absorption spectra of zinc

in the associated macrostructures show the appearance of an absorption maximum at 770 nm. The appearance of a maximum in the long wavelength region has been advanced as proof of protonization. Figures 1; references 12: 10 Russian, 2 Western.

12172/12379  
CSO: 1841/262

UDC 547.46'245

#### BIS-TRIALKYLSILYL METHYL ESTERS OF DICARBOXYLIC ACIDS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 19 Feb 85) pp 2300-2303

[Article by M.G. Voronkov, B. Shirchin, M. Tuyaa, D. Monkhoobor, A.A. Albanov, D. Densmaa and A. Chimidtsogzol, Institute of Chemistry, Mongolian People's Republic, Academy of Sciences, Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences]

[Abstract] Trialkyl(chloromethyl)silanes were reacted with the potassium salts of dicarboxylic acids in dimethylformamide to synthesize the corresponding bis-trialkylsilylmethyl esters in ca. 60% yield. NMR, IR and UV spectroscopic data on the esters are summarized in tabular form. Esters of oxalic and succinic acids stimulated germination of barley seeds, whereas the acids themselves exerted an inhibitory effect. References 4 (Russian).

12172/12379  
CSO: 1841/262

UDC 546.85:543.42

#### SYNTHESIS AND CHARACTERISTICS OF SELECTED DIALKYL(p- AND o- BROMOPHENYLO-) AND (p- AND o-NITROPHENYL)ARSONITES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 16 Jul 84) pp 2293-2297

[Article by N.A. Chadayeva, F.G. Khalitov, L.V. Avvakumova and R.R. Shagidullin, Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences; Kazan Institute of Chemical Technology imeni S.M. Kirov]

[Abstract] Investigations were conducted on the synthesis of esters of nitro- and bromosubstituted phenylarsonic acids for IR and Raman spectroscopic

characteristics. Dimethyl(o-nitrophenyl)-arsonite was prepared by reacting sodium methylate with o-nitrophenyldichloroarsine in benzene in an inert atmosphere at room temperature. An analogous approach was used for the synthesis of dimethyl(p-nitrophenyl)arsonite, dimethyl(p-bromophenyl)arsonite and dimethyl(o-bromophenyl)arsenite. Di-tert-butyl(o-nitrophenyl)-arsonite was synthesized by the reaction of tert-butanol with o-nitrophenyldichloroarsine in absolute benzene under an inert gas, using triethylamine for catalysis. A similar approach was used for the synthesis of related di-tert-butyl esters. In the dimethyl arsonites the  $\text{CAs}(\text{OR})_2$  groups was characterized by  $C_1$  symmetry, while in the di-tert-butyl derivatives by  $C_s$  symmetry.

References 11: 10 Russian, 1 Western.

12172/12379  
CSO: 1841/262

UDC 541.124:542,943:547.1'128

#### MECHANISM OF OXIDATION OF ORGANOPOLYSILANES WITH PEROXYACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 10, Oct 85 (manuscript received 11 Mar 84) pp 2177-2180

[Article by G.A. Razuvaev, T.N. Brevnova, V.V. Semenov, A.N. Kornev, M.A. Lopatin, G.V. Belysheva and A.N. Ygorochkin, Institute of Chemistry, USSR Academy of Sciences, Gorkiy]

[Abstract] A study was made of the formation of charge-transfer complexes of tetracyanoethylene with certain peralkylated and chloro-substituted polysilanes. The charge-transfer complexes of organosilanes with tetra-cyanoethylene have been found to manifest linear correlation of ionization potentials with charge-transfer band frequencies. Peralkylated polysilanes and organopolysilanes and organochloropolysilanes form weak contact-type complexes with TCE. The presence of electron-donor n-Bu and T-substituents leads to a decrease in charge-transfer frequency in comparison with compounds containing metallic substituents. Electron absorption spectroscopy of the complexes is used to determine the first ionization potential of peralkylated and chlorine-substituted organosilanes. Upon oxidation of the organopolysilanes with peroxybenzoic acid, the reaction occurs more slowly with increasing  $I_{\text{D}}^{\text{D}}$  within the limits of individually taken series of permethylated or chlorine-substituted polysilanes. Replacement of an alkyl group at the Si by a Cl atom accelerates the reaction. Figure 1; references 19: 5 Russian, 14 Western.

6508/12379  
CSO: 1841/222

UDC: 546.91:541.183

PLATINUM METAL COMPLEX FORMATION IN ADSORPTION BY GRANULATED IONITES AND CHELATE-FORMING ADSORBENTS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 10 Jan 85) pp 3-15

[Article by S.A. Simanova and Yu.N. Kukushkin, Department of Inorganic Chemistry, Leningrad Institute of Technology imeni Lensoveta]

[Abstract] Adsorption methods of concentration and separation of platinum metals using ionites and chelate-forming granulated adsorbents are discussed. A number of granulated organic ionites and chelate-forming adsorbents have been suggested for concentration and separation of platinum metals. Many publications on the subject are primarily simple reports concerning the possibility of using various adsorbents to extract platinum metals from concentrated solutions. Only a few works have been published studying the actual mechanism of adsorption. The data accumulated to date are scattered, with insufficient attention given to initial forms of platinum metal complexes in solutions. References 77: 67 Russian, 10 Western.

6508/12379  
CSO: 1841/161

UDC: 546.19+661.718.2

INTERACTION OF ARSENIC WITH XANTHOGENATES IN SULFATE SOLUTIONS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHMICHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 8 Mar 84) pp 27-31

[Article by A.D. Akbasova, V.P. Dzekunov, N.K. Valikhanova, A.K. Yurazalin, M.K. Naurybayev, Kazakh State University imeni S.S. Kirov, Alma-Ata]

[Abstract] A study is made of interaction of arsenic of varying valence with xanthogenates in sulfate solutions to determine the possibility of using the method of precipitation of xanthogenate complexes of arsenic for purification of process solutions containing arsenic in both 3 and 5-valent form. The results of the study show that both 3- and 5-valent arsenic can be precipitated from sulfate solutions as xanthogenates. The method of isomolar series was used to establish the composition of the arsenic xanthogenates obtained from solutions containing As with varying valence. It was found that the maximum light absorption corresponds to a molar ratio of reacting arsenic to

xanthogenate of 1:3. The results indicate the possibility of separation of arsenic of any valence from sulfate solutions as insoluble xanthenogate complexes. Figure 1; references 9 (Russian).

6508/12379  
CSO: 1841/176

UDC 542.91:541.49.5:547.466

SUBSTITUTION OF STANNYL GROUP IN  $X_3SnRe(CO)_5$  COMPLEXES ON EXPOSURE TO AMINO ACIDS AND THEIR DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 10, Oct 85 (manuscript received 16 Jul 84) pp 2372-2376

[Article by Yu.G. Kovalev and A.A. Ioganson, Institute of Chemistry and Chemical Technology, Siberian Department, USSR Academy of Sciences, Krasnoyarsk]

[Abstract] The authors suggested that when amino acid derivatives (L) act on  $X_3SnRe(CO)_5$ , as in the case of  $Br_3GeMn(CO)_5$ , the axial CO group would be replaced by the ligand L. However, it was found that  $Ph_3SnRe(CO)_5$  and  $Ph_2ClSnRe(CO)_5$  do not react with the methyl ester of L-leucine(L'), even upon long boiling in 1,4-dioxane, while the interaction of L' with  $Br_3SnRe(CO)_5$  unexpectedly leads to breaking of the Sn-Re bond and formation of a disubstituted rhenium carbonyl bromide derivative. Unfortunately, it was impossible to discover what happened to the stannyl fragment. The composition and structure of the rhenium carbonyl bromide derivative formed were established by elemental analysis and IR spectroscopy, then confirmed by converting it by successive reactions with acetonitrile and triphenylphosphine to known stable bromorhenium tricarbonyl complexes.  $SnCl_2$  was introduced at the Cl-Re bond of a bis-methylleucinate complex, yielding a low-melting-point bimetallic complex easily soluble in aliphatic hydrocarbons and resistant to heating in an inert atmosphere, but easily hydrolyzed in air, yielding a stable colorless product soluble in such polar solvents as tetrahydrofuran, MeOH and  $Me_2CO$ , insoluble in water. This derivative contains coordinated leucine ester molecules as ligands. References 13: 5 Russian, 8 Western.

6508/12379  
CSO: 1841/222

UDC 547.539.172/546.725/661.783

COMPOUNDS OF TRANSITIONAL METALS WITH sigma-BOUND FLUORO-CONTAINING GROUPINGS.  
Part 6. NEW METHOD OF PERFLUOROALKYLATION OF AROMATIC COMPOUNDS WITH AID OF  
PERFLUOROALKYL IRON COMPLEXES

Leningrad ZHURNAL ORGANICHESKOY KHMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 14 Aug 84) pp 1852-1857

[Article by I.I. Gerus, Yu.L. Yagupolskiy and L.M. Yagupolskiy, Institute of  
Organic Chemistry, UkrSSR Academy of Sciences, Kiev]

[Abstract] While perfluoroalkyl groups have been introduced directly to aromatic compounds by using perfluoroalkyl iodides at high temperatures by a radical mechanism, a more recent method was developed which employs cationic perfluoroalkylation with iodonium salts  $R_F^+(Ar)I^-X^-$ . This method, however, is confined to copper derivatives. In the present work, the possibility of using perfluoroalkyl complexes of iron as the perfluoroalkylating agent for aromatic compounds was studied. Silver fluoride was reacted with  $C_3F_7Fe(CO)_4I$  in the presence of an aromatic substrate such as benzene, toluene, anisole or furan at 20°C. The resulting isomeric composition of perfluoropropyl derivatives led to the conclusion that this is a cationic process. Also, if  $C_3F_7Fe(CO)_4OCOCF_3$  or  $(C_3H_7)_2Fe(CO)_4$  is heated in toluene, perfluoropropyltoluene is obtained. The cationic complex  $[C_3H_7Fe(CO)_4]^+BF_4^-$  reacts with dimethylaniline and sodium p-tolylthio-late to give p-perfluoropropyldimethylaniline and p-tolylperfluoropropyl sulfide, respectively. References 12: 3 Russian, 9 Western.

12765/12379  
CSO: 1841/207

## ORGANOPHOSPHORUS COMPOUNDS

UDC 547.26'118

### BIS (1,1,3-TRIHYDROPERFLUOROPROPYL)ISOCYANATOPHOSPHITE (I) AND TRIS(1,1,3-TRIHYDROPERFLUOROPROPYL)PHOSPHITE (II) IN REACTIONS WITH CARBONYL COMPOUNDS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 12 Oct 84) pp 2189-2194

[Article by I.V. Konovalova, L.A. Burnayeva, E.K. Khustutdinova, G.S. Khafizova and A.N. Pudovik, Kazan State University imeni V.I. Ulyanov-Lenin]

[Abstract] Studies on the reaction of I with nitrilobenzoylformic acid at room temperature in 1:1 ratio showed the formation of a bipolar ion that stabilizes as a result of closing of a 5-membered ring with a P=N bond. Subsequent cyclodimerization of the substituted 1,4,3-oxazaphosphol-3-ene leads to 1,6-diaza-4,9-dioxa-5,10-dioxo-3,8-diphenyl-3,8-dicyano-2,2,7,7(1,1,3-trihydro-2'erfluoropropoxy)-2  $\lambda^2$ ,7  $\lambda^3$ -diphosphatricyclo[5,3,0,0]decane. Reaction of I with chloral proceeds in an analogous manner. II reacted with chloro- and bromo- pyruvic acid esters and trichloroacetyl phosphonic acid with the formation of enol phosphates in the form of substituted vinyl phosphates. The reaction of II with nitrilobenzoylformic acid resulted in the synthesis of  $\alpha$ , $\beta$ -dicyanostilbene and tris(1,1,3-trihydroperfluoropropyl)phosphate.

References 11: 7 Russian, 4 Western.

12172/12379  
CSO: 1841/262

UDC 542.91+661.718.1

SYNTHESIS AND SELECTED CHARACTERISTICS OF HALOGENATED N-PHOSPHORYLATED 4,5-BENZO-1,3,2-AZAHETEROPHOSPHOLANES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 25 Sep 84) pp 2185-2188

[Article by M.A. Pudovik, Yu.B. Mikhaylov, L.K. Kibardina, A.A. Kuliyev, V.V. Moskva, D.A. Akhmetdzade and A.N. Pudovik, Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] An approach was taken to secure an easy and convenient method for synthesizing halogenated N-phosphorylated 4,5-benzo-1,3,2-azaheterophospholanes, relying on the phosphorylation of o-aminophenol and o-aminothiophenol with  $PBr_3$  and  $PCl_3$ . Heating of o-aminophenol with  $PCl_3$  in a ratio of 1:2 led to the synthesis in high yields of 2-chloro-3-dichlorophosphino-4,5-benzo-1,3,2-oxazaphospholanes (I). Reaction of o-aminothiophenol with 2 equivalents of  $PCl_3$  led to the preparation of N-phosphorylated thiazaphospholane, which was converted to the amido derivative because of thermal instability. Reaction of o-aminophenol with  $PBr_3$  leads to the stable 2-bromo-4,5-benzo-1,3,2-oxazaphospholane. Reaction of the I compounds with triethylamine led to a series of 2-alkoxy-3-dialkoxyphosphino-4,5-benzo-1,3,2-oxazaphospholanes summarized in tabular form. References 4 (Russian).

12172/12379  
CSO: 1841/262

UDC 547.26'.118.07

CHEMICAL TRANSFORMATION OF PHOSPHORUS ACID HYDRAZIDES. PART 4. REACTION OF HYDRAZIDES OF AMIDOPHOSPHORIC ACIDS WITH p-TOLUENESULFOCHLORIDE AND SELECTED PHYSICOCHEMICAL CHARACTERISTICS OF REACTION PRODUCTS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 10, Oct 85 (manuscript received 5 May 84) pp 2249-2254

[Article by V.M. Ovrutskiy, A.Ye. Boldeskul, M.I. Golubov and T.M. Chernova, Kiev Scientific Research Institute of Pharmacology and Toxicology; Ukrainian SSR Ministry of Health]

[Abstract] Reaction of O-aryl(hydrazido)-N,N-di(2-chloroethyl)-amidophosphoric acids with p-toluenesulfochloride at 50°C for 4 h led to the synthesis of previously undescribed  $\beta$ -toluenesulfonylhydrazides of O-aryl-N,N-di(2-chloroethyl)amidophosphoric acids (I). The latter products were isolated as colorless crystals that are soluble in benzene, alcohols and dimethyl

sulfoxide, and insoluble in water. IR spectroscopy was employed for structural confirmation; furthermore, substitution in the  $\beta$ -position of the hydrazino group was confirmed by the fact that  $\alpha$ -toluenesulfohydrazides fail to form hydrazone on reaction with p-nitrobenzaldehyde. UV spectroscopy underscored the relationship between the acid-base characteristics of the I compounds and their structural features. Deprotonation of I led to the formation of an azo group, while polarographic behavior of the I compounds in reduction reactions, in conjunction with Hammet-Taft and Taft-Zuman analyses, showed that introduction of p-toluenesulfo group increases polarographic activation. The latter induced two competitive potential-determining reactions that resulted in sign inversion of  $\alpha_{\pi}$ . A positive sign for  $\alpha_{\pi}$  in this case indicates that the potential-determining stage terminates with carbocation formation.

References 15: 13 Russian, 2 Western.

12172/12379  
CSO: 1841/262

UDC 542.91:547.1'118

#### SYNTHESIS OF AMMONIUM 5-OXO-1,3,2,5-DIOXABORONATOPHOSPHORINANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 10, Oct 85 (manuscript received 5 Jun 84) pp 2369-2372

[Article by B.A. Arbuzov, G.N. Nikonov and O.A. Yerastov, Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] The discovery of basic catalysis upon interaction of oxyalkyl phosphinoxides with boric acid esters opens new possibilities for synthesis of boroxyalkyl derivatives of phosphorus. This article demonstrates that the interaction of bis(alpha-oxyalkyl)-phenyl-phosphineoxides with i-BuOBOPh<sub>2</sub> in the presence of amines leads to the formation of ammonium-5-oxyl-1,3,2,5-dioxaboronatophosphorinanes. Phenyl phosphineoxides are obtained by oxidation of bis(L5 and oxyalkyl) phenylphosphines and are stable crystalline compounds. A study is made of the influence of substituents at the C atom and basicity of the amine. References 7 (Russian).

6508/12379  
CSO: 1841/222

UDC: 543.544.25

ESTIMATE OF SELECTIVITY OF ORGANOPHOSPHORUS STATIONARY PHASES ON BASIS OF POLARITY FACTORS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHNOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 28 Nov 83) pp 36-39

[Article by L.V. Ryazanova, V.F. Novikov and M.S. Vigdergauz, Department of Analytic Chemistry, Kazan Chemical-Technology Institute imeni S.M. Kirov]

[Abstract] The selective properties of a number of organophosphorus stationary phases with donor or acceptor centers were studied. The studies were performed on a chromatograph with a heat conductivity detector. Analysis of standard sorbates including benzene, ethanol, methylethylketone, nitromethane and pyridene was used to determine linear retention indices from which polarity factors were computed. Selectivity of separation of polar sorbates on the stationary phases studied was found to depend on structure of the substituent at the phosphorus atom and to be determined by the presence of a free pair of phosphoryl oxygen electrons. Figures 3; references 3: 1 Russian, 2 Western.

6508/123/9  
CSO: 1841/161

UDC: 547.819:547.241.284+547.447.2

REACTION OF AMINOMETHYLATION IN PHOSPHORUS-CONTAINING HETEROCYCLES. REPORT 1. SYNTHESIS OF AMINO Methyl DERIVATIVES OF TRANS-ISOMER OF 1-PHENYL-1-THIO-2,5,-DIMETHYL PHOSPHORINAN-4-ONE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 2 Dec 83) pp 36-40

[Article by T.I. Ravetskaya, Yu.G. Bosyakov and A.P. Logunov, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma-Ata]

[Abstract] Results are presented from a study of aminomethylation of the trans-isomer of 1-phenyl-1-thio-2,5-dimethyl phosphorinan-4-one (I), MP 108-109°C, by various aminomethylating agents including N-methylene morpholine chloride (II), morpholine hydrochloride with paraform or formaline, and epoxy methylene morpholine. A mixture of mono- and di-beta-amino ketones are formed in the reaction. The major side products are unsaturated ketones with exocyclic double bond. The results of the reaction are determined by reaction conditions and aminomethylating agent used. References 7: 1 Russian, 1 Western.

6508/12379  
CSO: 1841/176

PESTICIDES

UDC 547.551.51

SYNTHESIS OF N-(2-METHOXYETHYL)-N-ARYL-3-CYCLOHEXYLPROPANAMIDES AND STUDY OF THEIR MASS SPECTRA

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 8 Dec 83) pp 1983-1986

[Article by A.I. Azimov, T.T. Dustmukhamedov, U.A. Abdullayev and M.A. Safayev, Tashkent Polytechnic Institute imeni A.R. Beruni, Institute of Chemistry of Plant Substances, UzSSR Academy of Sciences, Tashkent]

[Abstract] Tests on previously prepared N-(2-methoxyethyl)chloroacetanilids for herbicidal activity on cotton plants show that they are highly effective. In an effort to find new pesticides in this series, N-(2-methoxyethyl) arylamines were treated with 3-cyclohexylpropanoic and 2-methyl-3-cyclohexylpropanoic acid chlorides. Mass spectra of the resulting N-(2-methoxyethyl)-N-aryl-3-cyclohexylpropanamides and N-(2-methoxyethyl)-N-aryl-2-methyl-3-cyclohexylpropanamides show that those compounds having a substituent on a position ortho to the nitrogen, when subjected to electron impact, form the bicyclic oxonium ion O-methylbenzoxazidinium as a result of the elimination of the ortho-substituent. This can be explained within the framework of the ortho-effect rule. Tests showed that N-(2-methoxyethyl)-N-(o-, m-, p-tolyl)-3-cyclohexylpropanamides and the m-anisyl analogs had the highest fungicidal activity, approaching that of tetra-methylthiuram disulfide, used as a standard. References 7: 4 Russian, 3 Western.

12765/12379  
CSO: 1841/207

PETROLEUM PROCESSING TECHNOLOGY

UDC: 665.45.054.543.(8+422)

PETROLEUM AND KIR ASPHALTENES. VII. COMPOSITION ANALYSIS OF MALTENE AND ASPHALTENE COMPONENTS OF TYPICAL WESTERN KAZAKHSTAN PETROLEUM AND BITUMEN

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMECHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 17 Jul 84) pp 63-68

[Article by N.K. Nadirov, A.K. Lebedev, G.A. Musayev, G.V. Fishchuk, M.Sh. Yesenbayeva, V.F. Kambyanov and Ye.V. Kholina, Institute of Chemical Sciences, Kazakh SSR Academy of Sciences, Alma-Ata; Institute of Petroleum and Natural Salt Chemistry, Kazakh SSR Academy of Sciences, Guryev; Institute of Petrochemistry, Siberian Department, USSR Academy of Sciences, Tomsk]

[Abstract] Continuing a comparative study of petroleums and natural bitumens (kirs) of Western Kazakhstan, the physical, chemical and spectral characteristics of certain natural petroleums and bitumens of the area are studied. Petroleums were first fractionally distilled. Asphaltenes from petroleum residues and the organic portion of the kirs were extracted with pentane, then additionally with n-heptane in a Soxhlet apparatus, yielding maltenes. Elemental composition was determined by traditional methods. The content of asphaltenes and tars in the petroleum residues were significantly lower than in the natural bitumens, decreasing with an increase in depth of deposition of the petroleum. The content of nitrogen in the oils is very low, whereas the fraction of nitrogenous components in the petroleum resins is 35-42%, in petroleum asphaltenes--67-80%, increasing with deposition depth. Oils and resins in some cases contained well-developed aliphatic fragments even in cases when distillate fractions of petroleums had clearly napthenic or napthenic-aromatic nature. Kir asphaltenes and tars differed from petroleum substances in their elevated general cyclicity, aromaticity, oxidation and reduced concentrations of nitrogen and sulfur. References 5 (Russian).

6508/12379  
CSO: 1841/176

UDC 681.3.06

MANAGEMENT SYSTEM FOR RELATIONAL DATA BASE IN AUTOMATIC CONTROL SYSTEMS

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST in Russian No 4, Oct-Dec 85 pp 49-50

[Article by A.I. Berezin, D.B. Gusakov and V.P. Plyuta, GIVTs [expansion unknown] of the Ukrainian SSR State Petroleum Products Complex]

[Abstract] Description is provided of an electronic data processing system for the management of relational data bases at automatic control systems, using the "Information Input and Control" series of programs in VKI-3 language. The system provides for data input into the computer, verification of reliability, correction of errors detected in the input, correction of relational aspects in the data base, and result output. Programming requires less than 150 kilobytes of operational memory, with processing of 1000 documents completed in less than 10 min on ES computers. The inclusion of a new document requires its description in VKI-3 language, which is less expensive to use than procedurally-oriented languages PL/I or COBOL.

12172/12379  
CSO: 1841/263

PHARMACOLOGY AND TOXICOLOGY

UDC 543.5/547.466.3:542.91

MASS SPECTRA OF POSITIVE AND NEGATIVE IONS OF N-SUBSTITUTED alpha-PYRROLIDONE  
AND gamma-AMINOBUTYRIC ACID

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 16 Jun 84) pp 1986-1993

[Article by A.I. Yermakov, A.P. Pleshkova, A.A. Sorokin, S.Ya. Skachilova,  
M.G. Plishakov and A.P. Zuyev]

[Abstract] N-Substituted derivatives of alpha-pyrrolidone and the corresponding gamma-aminobutyric acid have a broad spectrum of pharmacological activity and are used as intermediates in the synthesis of other biologically active substances. Mass spectrum decomposition of these compounds, however, has not yet been fully studied. In the present work a study was made of the mass spectra of positive and negative ions of the above to establish criteria for the identification of these compounds. In the case of N-benzoyl derivatives, the resistance of the alpha-pyrrolidone ring and that of the exocyclic amide bond to electron impact depends on the position and type of substituent on the benzene ring. During dissociative resonance capture of electrons by molecules of N-substituted alpha-pyrrolidone, negative ions are formed in the high energy region ( $E = 5-8$  ev) with rupture of amide bonds in molecular ions. During decomposition by electron impact of N-acyl derivatives of the gamma-amino acids, rearrangement processes take place to form stable ions from the amino acid group. The  $[M-H]^-$  anion manifests maximum intensity in the negative ion spectra of gamma-aminobutyric acid. References 5:  
3 Russian, 2 Western.

12765/12379  
CSO: 1841/207

UDC 547.46 82 83:541.132

RELATIONSHIP BETWEEN BASICITY AND ACIDITY OF PYRIDONES, QUINOLONES,  
ISOQUINOLONES, THEIR THIOANALOGS, ACRIDONES AND ALIPHATIC AMINO ACIDS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 14 Jun 83) pp 1999-2005

[Article by V.I. Zayonts and Ye.Sh. Gutshabash, All-Union Scientific-Research  
Veterinary Institute of Aviculture, Leningrad]

[Abstract] The molecule of a highly polar, tautomeric, amphoteric organic compound is a dipole having both proton acceptor (basic) and proton donor (acidic) sites. It may be postulated, therefore, that an increase in electron polarization of such a dipole which increases either the negative charge on the basic site or the positive charge on the acid site under otherwise equal conditions, should also increase both the basic and acidic properties of an amphoteric compound. Comparison of acidity and basicity in pyridones, quinolones, isoquinolones, their thioanalogs and acridines shows that a direct correlation does exist between acidity and basicity. In the case of 5-substituted tetrazole and the Zwitter-ion form of aliphatic aminoacids, a reverse correlation exists, while in oxypyridones, oxyquinolines, oxyisoquinolines and their thioanalogs, oxyacridines and neutral forms of aliphatic amino acids, no such correlation exists. Figure 1; references 20: 7 Russian, 13 Western.

12765/12379  
CSO: 1841/207

POLYMERS AND POLYMERIZATION

UDC 531.3:541.64

DETERMINATION OF THERMAL STABILITY OF POLYMERS DURING RAPID RATES OF HEATING

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHMICHNYKH NAVUK in Russian No 5, Sep-Oct 85 (manuscript received 3 Jan 84) pp 46-49

[Article by D. A. Rodchenko, Ye. L. Snezhkov and M. Ya. Grebenschik, Belorussian Institute of Railroad Transport Engineers and the Institute of the Mechanics of Metal-Polymer Systems, BSSR Academy of Sciences: "Determination of the Thermal Stability of Polymers During Rapid Rates of Heating"]

[Text] During high-temperature technological processes and operating conditions, for example, during gas plasma spraying, plasma treatment, thermal impacts, and burning, a polymer may be subjected to the brief effect of temperatures which considerably exceed its melting and flow points. The rate of heating the polymer under such conditions exceeds hundreds of degrees per second; the anisotropy and the nonstationary character of the polymer decomposition process complicate the method for determining its thermostability [1-4].

It is suggested [1] that the temperature at which decomposition begins be determined in its capacity as the basic characteristic property of the thermal stability of the polymer; this enables the dynamic parameters of heating of the polymer to be related to the conditions of heat exchange and enables the induction periods of thermal degradation reactions to be determined. The temperature at which decomposition begins is determined by the change in the electrical conductivity of the surface layer, if sooty products are formed as the result of pyrolysis, and according to the increase in the intensity of the emission of the fixed gas volume in the boundary layer.

The method and apparatus of Galchenko [2] were used to study high-temperature pyrolysis, heat-transfer processes, and the rate of vaporization; it enables the losses of polymer mass to be recorded with high precision under conditions simulating the action of flames. However, the use of this apparatus, especially in technological and plant laboratories, is limited by its complexity and by the necessity to use scarce equipment.

We propose a simpler and adequately sensitive method for determining the thermostability and thermal parameters of polymers; it is based on the use of a capacitance transducer as an indicator of the mass of the polymer sample.

The apparatus consists of a control unit, a capacitance transducer, and a recording instrument. A stabilized source of power, a high-frequency generator

Fig. 1. Schematic Diagram of the Capacitance Transducer

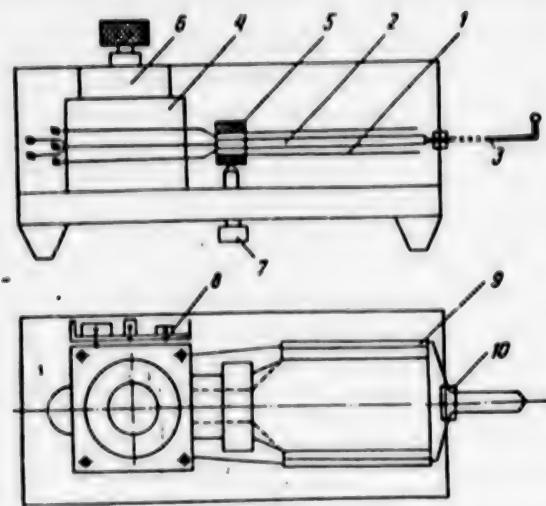


Рис. 1. Схема емкостного датчика: 1 — неподвижные пластинки конденсатора, 2 — подвижная пластина конденсатора, 3 — термопара, 4 — изолятор фторопласт, 5 — фиксатор положения пластин, 6 — потенциометр балансировки моста, 7 — механический корректор нуля, 8 — монтажное плато детектора и фильтра, 9 — фарфоровый изолятор термопары, 10 — изолятор фиксатор термопары

**Key:**

1. Stationary capacitor plates
2. Movable capacitor plate
3. Thermocouple
4. Fluoroplastic insulator
5. Plate position index pin
6. Potentiometer of the balancing of the bridge
7. Mechanical corrector of the zero point
8. Wiring plateau of the rectifier and filter
9. Porcelain insulator

(2.5 MHz), a potentiometer for regulation of sensitivity, and a clamper capacitance are placed in the control unit.

The capacitance transducer (Fig. 1) consists of three capacitor plates 1, 2, the middle one of which simultaneously is a resilient element of a weighing system and mount of the thermocouple wires leading to the thermocouple 3. The middle plate is insulated with a fluoroplastic film. Plates 1, 2 are attached to the insulator 4 and have the ability to move by means of the device 5; 7 is the index pin of the position of the plates and the mechanical corrector of the zero point. The insulator has a wiring plateau 8 with a phase-sensitive rectifier on the diodes D<sub>1</sub>-D<sub>4</sub> and a high-frequency filter. The potentiometer 6 serves to balance the bridge.

The apparatus works in the following way. After the current is switched on, the generator produces high-frequency sinusoidal vibrations, which, in the form of a signal (100 V, 2.5 MHz), enter the middle plate of the capacitor which has

previously been set between the outer plates. An alternating current branches to two parallel-plate capacitors and flows toward the middle point of the potentiometer. The voltage discharged on the halves of the potentiometer is rectified in opposite polarities. At the balance of the bridge, the signal is equal to zero at the outlet. With deflection of the middle plate in one or the other direction, the signal at the outlet of the bridge changes in a positive or negative direction.

The heating temperature is measured by a thermocouple PP, and its signal goes directly to the recording instrument through the corresponding terminal. The results of analysis can be recorded, for example, on a two-coordinate PDS-021 M instrument in the form of a dependence of temperature on mass or on a KSP-4 instrument in the form of a dependence of mass on time. The resolving power of the apparatus for mass with all errors being taken into account comprises  $0.5 \pm 0.1$  mg. The linearity of the transducer does not exceed the limits of 3 percent with a time lag of 1.0-1.5 ms. Upon the whole, the time lag of the apparatus is determined by the recording instrument being used. Therefore, the selection of the recording instrument dictates the necessary form and precision of the recording of the results.

Inasmuch as the capacitance transducer is very sensitive to mechanical effects (vibration, air perturbations) the apparatus must be placed on a stable support and used as a highly sensitive weighing instrument.

**Fig. 2. Dependence of the Loss of Mass of Polytrifluoroethylene Samples on Temperature in a Thermal Chamber (a) and on Time (b): 1--923 K, 2--1073, 3--1098, 4--1148, 5--1273**

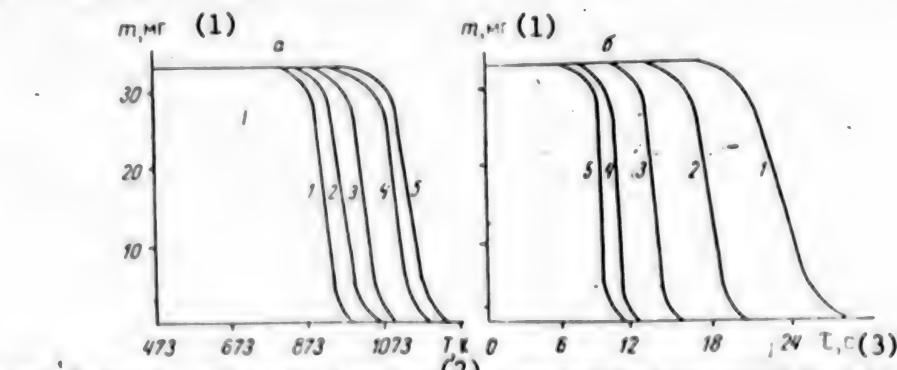


Рис. 2. Зависимость потери массы образцов политрифторхлорэтилена от температуры в термокамере (а) и времени (б): 1 — 923 К, 2 — 1073, 3 — 1098, 4 — 1148, 5 — 1273 К

#### Key:

1. Mass, mg
2. Temperature, K
3. Time, seconds

In the conducting of analysis primarily by a mechanical corrector, the middle plate of the capacitor is mounted closely between the outside plates. The instrument is engaged, and the balance of the bridge (zero) is checked at the control unit. Then, the recording device is switched on.

The cylindrically-shaped sample with a blind opening and a mass of 0.01-0.1 g is put on the head of the thermocouple. The thermal chamber (or flame) at a given temperature is slid carefully over to the thermocouple with the sample. The thermal chamber is first mounted on a sliding carriage made of a heat-resistant material, the sliding of which is precisely regulated.

When the sample size is small, heating takes place rapidly, and, after heating, a temperature gradient is practically absent within the cupela. After evaporation of the polymer, the thermocouple is switched off at the corresponding temperature of the medium of the thermal chamber.

Curves are given in Fig. 2 of the losses of mass of polyfluorochloroethylene at different temperatures in an air medium, obtained on an apparatus with a capacitance transducer. The temperature of the medium in the thermal chamber corresponds to the temperature at the point of intersection of the curve with the abscissa axis in Fig. 2,a.

The dependency obtained makes it possible to establish the temperature of the beginning of intensive losses of mass ( $T_d$ ) of polymer samples in dependence on the temperature of the medium at a high rate of heating, and also the induction periods of the processes of thermal decomposition of the polymers. The dependence of  $T_d$  on the induction period enables the thermal stability to be judged under specific conditions.

The apparatus with the use of the capacitance transducer as an indicator of losses of mass can be used in a rapid method for determining the thermal stability of polymers in technological and plant laboratories, and also in the study of thermal parameters of the process of decomposition of a polymer during rapid heating, for example, by the use of methods of calculation described by Galchenko [2].

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12410  
CSO: 1841/217

UDC 686.49

PHOTOCHEMICAL ACTIVATION OF SURFACE OF POLYIMIDE FILM WITH CHEMICAL DEPOSITION OF COPPER

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHMICHNYKH NAVUK in Russian No 5, Sep-Oct 85 (manuscript received 27 Jun 84) pp 119-120

[Abstract of article by T. N. Vorobyeva and T. I. Bodrykh, Physical-Chemical Problems Scientific Research Institute, Belorussian State University imeni V. I. Lenin, "Photochemical Activation of the Surface of a Polyimide Film with Chemical Deposition of Copper"]

[Text] Different methods of photochemical activation of a polyimide film with chemical deposition of copper are compared. It is shown that to obtain uniform copper designs with a good external appearance, little porosity, high resolution (6-7 lines/mm), good adhesion to the support (170-210 g/3mm), a polyimide film can be activated photochemically by means of Sn(II)-Pd(II) and Fe(III)-Cu(II) redox systems.

A study was conducted of a number of properties of copper designs (boundary resolution, adhesion of copper to the support, uniformity and porosity of copper coatings) and of the morphology of the support at different stages of preparation of the support for metallization and deposition of copper. It was established that optimal results are obtained only under those conditions in which the surface of the etched polyimide film is homogeneous and fine-grained, the layer of activator particles is uniform and single-stage, catalytically active particles of metal are distributed uniformly along the surface of the support, and have high concentrations ( $0.4\text{-}1.4 \cdot 10^3 \mu\text{m}^{-2}$ ) and small dimensions (15-200A).

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CSO: 1841/217

## ADDITIVES FOR PRODUCTION OF ANTISTATIC POLYMERS

Moscow VECHERNYAYA MOSKVA in Russian 10 Jan 86 p 1

[Article by A. Gatilov]

[Excerpt] Polymer materials and products made of them are becoming more and more common in our life.

Light, elastic, durable, resistant to corrosive agents and inexpensive, these materials are being used in industry and in the home. But these amazing man-made materials have one drawback--the property of accumulating static electricity on their surfaces.

After several years of work, research conducted at the Institute of Precision Chemical Engineering imeni Lomonosov has been crowned with success.

"We performed hundreds of tests and experiments before we succeeded in finding special additives which were the fillers we needed," said Candidate of Technical Sciences A. Blinov. "These additives are put into the materials as they are being made. Each polymer has its own composition. The most effective recipes have been developed for rubbers."

Rubber hoses manufactured by the new process are fireproof. These hoses are intended for fueling motor vehicles and airplanes.

FTD/SNAP/12379  
CSO: 1841/280

## PRIIZE RECIPIENTS FOR WORK ON LIQUID CRYSTAL POLYMERS

Leningrad LENINGRADSKAYA PRAVDA in Russian 21 Nov 85 p 1

[Abstract] Photographs are given of two Leningrad residents who received the 1985 USSR State Prize for the cycle of works "Physical Chemistry of Synthetic Liquid Crystal Polymers", which was published over the period 1968-1983. They are: Doctor of Physical-Mathematical Sciences Sergey Yakovlevich Frenkel, head of a department of the USSR Academy of Sciences' Institute of Macromolecular Compounds, and Doctor of Physical-Mathematical Sciences Irina Nikolayevna Shtennikova, senior science associate of this institute.

## STATE PRIZE RECIPIENTS FOR LIQUID CRYSTAL POLYMER RESEARCH

Moscow LENINSKOYE ZNAMYA in Russian 17 Nov 85 p 4

[Abstract] A photograph is given showing four associates of the "Khimvolokno" (chemical fiber) Research and Production Association in Mytishchi who received the 1985 USSR State Prize for their contribution to a cycle of works entitled "Physical Chemistry of Synthetic Liquid Crystal Polymers". The four are doctors of chemical sciences M.M. Iovleva, V.G. Kulichikhin and S.P. Papkov, and Doctor of Technical Sciences, A.V. Volokhina.

## WORK ON HIGH-STRENGTH POLYMER MATERIALS

Leningrad LENINGRADSKAYA PRAVDA in Russian 1 Dec 85 p 1

[Author] S. Samoylis

[Abstract] The article reports on work which the USSR Academy of Sciences' Institute of Macromolecular Compounds is doing on development of polymers with special properties.

The institute's department of the strength of polymers is headed by Doctor of Physical-Mathematical Sciences, Professor Sergey Yakovlevich Frankel, a laureate of the 1985 State Prize. Promising studies have been made here of processes of the crystallization of polymers in various conditions, particularly conditions of the deformation of a polymer system. Doctor of Physical-Mathematical Sciences Galina Kazimirovna Yelyashevich, a senior science associate, is quoted in regard to a method called orientation crystallization which has been developed for the purpose of obtaining high-strength polymers. One square millimeter of a film made of such polymers reportedly is able to withstand a load of 40 kilograms.

Preparations reportedly have been made for introducing developments of the institute into production at the "Plastpolimer" Research and Production Association. A new line for producing a high-strength strapping tape, LPM-11, has gone into operation at this association.

FTD/SNAP/12379  
CSO: 1841/280

OPTIMIZATION OF ELECTROINSULATING PROPERTIES OF PHENOPLASTS WITH MINERAL FILLERS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHMICHESKAYA in Russian No 6, Nov-Dec 85 (manuscript received 14 Jul 83), pp 49-52

[Article by Zh.Zh. Bayarstanova, I.P. Zherebtsov, A.N. Imanov, Sh.Ye. Yerdenova, L.M. Kozakov, Sh.B. Battalova and A.A. Likerova, Institute of Chemical Sciences, Academy of Sciences, Kazakh SSR, Alma-Ata]

[Excerpt] By a mathematical planning method, the regimen of pressing phenoplasts containing mineral fillers and with high electroinsulating properties is optimized. It is established that high dielectric properties of the samples are attained at a pressing temperature of 180 C, a time interval of 4.5 minutes, and a preliminary warming period of 8.94 minutes. It is shown that such material can be used in high humidity.

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/12379  
CSO: 1841/321-P

NEW DEVELOPMENTS IN POLYMER TECHNOLOGY

Moscow TASS in English 15 Jan 86

[Text] Soviet physicists suggest producing polymers, or synthetic compounds, by deforming their components through high pressure, which makes the process of polymerization, that is the transfer of a substance into a different state, last only a matter of minutes, a TASS correspondent was told at the Institute of Chemical Physics of the Academy of Sciences of the USSR.

Solid substances do not enter into a chemical reaction with each other. To make them interact with each other, they are first either dissolved or melted for several hours, with costly catalysts used to expedite the process.

But if a would-be polymer's components are compressed and deformed, the reaction will be instantaneous, explains Academician Nikolai Yenikolopov, one of the method's discoverers.

Taking advantage of high pressure, scientists have already produced several polymers with such unusual properties as plasticity, conductivity and strength.

They have also used deforming techniques to harden cutting tools made from steel. During this procedure, the cutting blade is covered with a composite

material which is then deformed by applying pressure to produce a durable film just several micrometers thick that can be honed with a diamond and makes the tool last several times longer than before.

The new technologies, Academician Yenikolopov says, will include levers which will help raise labor productivity in the country quickly. Work to develop such new techniques and plants is envisaged by the draft new edition of the program of the Communist Party of the Soviet Union, which has been submitted for nationwide discussion before being considered at the 27th Party Congress next February. The draft stresses the need to accelerate scientific and technological progress in the country precisely by developing and adopting new production techniques and machinery.

/12379  
CSO: 1841/286

UDC 542.91:547.64:547.1'13

SIMPLE METHOD OF INSERTION ( $\eta^5\text{-C}_5\text{H}_5$ ) $\text{Co}(\eta^4\text{-C}_5\text{H}_5)$  FRAGMENT INTO POLYMER

Moscow IZVESTIYA AKADEMII NAUK SSR: SERIYA KHMICHESKAYA in Russian No 10, Oct 85 (manuscript received 1 Jun 84) pp 2376-2380

[Article by V.A. Sergeyev, Ye.V. Leonova, N.S. Kochetkova, deceased, A.N. Sokolova and N.N. Rukhlyada, Institute of Heteroorganic Compounds imeni A.N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] Several methods are known for synthesis of organometallic polymers. These include grafting of a  $\pi$  transition metal complex to a polymer matrix to form a C-C bond between the ligand of the complex and the polymer. This is the method used in this work. A simple preparative method was developed to insert a cobalt  $\pi$  complex into a polymer matrix. The method is based on the ability of cobaltocene to interact with organic halides. The structure of the cobalt  $\pi$  complex on a polymer substrate is established. References 10: 5 Russian, 5 Western.

6508/12379  
CSO: 1841/222

UDC: 532.626.1:669

### WETTING OF GROUP III METALS BY ORGANIC FLUIDS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 5, Sep-Oct 85, (manuscript received 26 Mar 84) pp 878-883

[Article by V.G. Lundina, L.I. Kurnikova, V.I. Kononenko, M.A. Bulatov and A.L. Sukhman, Institute of Chemistry, Urals Scientific Center, USSR Academy of Sciences, Sverdlovsk]

[Abstract] It is difficult to study wetting during conversion of resins to polymers. Wetting of aluminum, scandium, cerium, samarium and lutecium by fluorene-containing polymers was studied and interactions between phases occurring at the solid-liquid interface were analyzed. Therefore, an approach was used in this article in which the initial resins and polymers formed from them and, consequently, the process of conversion of the resin to polymer, were modeled by simple organic compounds reflecting the chemical structure of the basic polymer chain and functional groups of the resin and polymer. Wetting was studied using the equilibrium contact wetting angle formed by a drop of liquid on a polished metal substrate. The studies indicated that the best wetting of aluminum, samarium, scandium, cerium and lutecium is provided by a model of fluorene-containing and phenol-formaldehyde polymers. Theoretical estimates of the components of the work of adhesion showed that the basic form of interaction between the pairs studied is represented by dispersion forces. Figure 1; references 10: 6 Russian, 4 Western.

6508/12379  
CSO: 1841/163

UDC: 621.891

### STUDY OF FRICTION PROCESSES IN LUBRICATING MEDIUM CONTAINING MODIFIED POLYETHYLENE WASTES

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMECHESKAYA in Russian No 5, Sep-Oct 85 (manuscript received 18 Jun 85) pp 88-93

[Article by T.G. Yezhikova-Babakhanova, O.A. Ustrekhova and A.I. Soshko, Lvov Polytechnic Institute]

[Abstract] A study is presented of the specifics of the process of friction in a lubricating medium containing low-molecular weight polyethylene modified with phosphorus and bromine. Lubricating compositions were prepared by dissolving modified polyethylene in mineral oil. Increasing polyethylene concentration improved lubricant properties up to 10-30 mass percent. The content of the

phosphorus and bromine in the polymer chain was 13.5 and 12%. The chemical transformations of the additives were studied by thermography. Thermal oxidative reactions in polyethylene resulted in the formation of oxygen-containing carbonyl, carboxyl, peroxy and hydroxyl groups, helping to increase the adsorption properties of the polyethylene macro molecules. Figures 3; references 14 (Russian).

6508/12379  
CSO: 1841/176

UDC: 54-148:546.621+678.644'142

INFLUENCE OF POLYETHYLENE OXIDE ON STRUCTURAL AND MECHANICAL PROPERTIES OF SYNTHETIC CORUNDUM

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 11 Aug 83) pp 79-82

[Article by A.F. Krivoshchepov, L.V. Samuylova and Yu.G. Frolov, Department of Colloid Chemistry, Moscow Institute of Chemical Technology imeni D.I. Mendeleyev]

[Abstract] The purpose of this work was to study the influence of the addition of polyethylene oxide on the structural and mechanical properties of  $\text{AlPV}_2\text{PVO}_3$  suspensions. It is known that the hydrodynamic resistance of a fluid is greatly reduced by the addition of PEO and it was therefore of interest to study its influence on dispersed systems with great specific surface, since in such systems the layers of liquid between particles should determine the nature of interaction of the particles. It was found that addition of 0.025% PEO by weight can effectively influence the structural and mechanical properties of highly dispersed suspensions, increasing the content of the dispersed phase, improving technological properties. Figures 4; references 6: 5 Russian, 1 Western.

6508/12379  
CSO: 1841/161

UDC: 541.64.532.135.539.2

RHEOLOGIC PROPERTIES OF MELT AND MICROSTRUCTURE OF EXTRUDATES OF  
POLYOXYMETHYLENE-POLYSTYRENE MIXTURES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA  
TEKHNOLGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 3 Jan 84)  
pp 92-96

[Article by M.V. Tsebrenko and M.N. Osadchaya, Department of Chemical Fiber  
Technology, Kiev Light Industry Technology Institute]

[Abstract] A study is presented of the rheologic properties of melts of polyoxymethylene-polystyrene mixtures and the microstructure of extrudates based on them as a function of composition, shear stress and degree of dispersion of the dispersed-phase polymer. The results obtained are compared with results for polyoxymethylene-copolyamide mixtures. A quantitative analysis of structure formation in polyoxymethylene-polystyrene extrudates was performed and viscosity data for the melts were obtained over a broad range of shear stresses. With up to 50% polyoxymethylene, it forms ultrathin fibers in the polystyrene mass as the mixture is extruded, fiber formation improved by repeated extrusion of the melt through viscosimeter capillaries. The fibers are coarser in the mixture with polystyrene than with copolyamide, a significant portion of the polyoxymethylene being expended in the formation of films. Figures 4; references 18: 14 Russian, 4 Western.

6508/12379  
CSO: 1841/161

UDC 678.743/088.8/

SYNERGISM IN STABILIZATION OF POLYVINYL CHLORIDE IN PRESENCE OF MIXTURE OF  
STABILIZERS

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript  
received 31 Jan 85) pp 31-34

[Article by N.A. Abduvaliyev and A.A. Nabiiev, Institute of Chemistry and  
Physics of Polymers, Uzbek SSR Academy of Sciences]

[Abstract] The authors are studying optimal compositions with the greatest synergistic effect to reduce the consumption of stabilizers in the creation of polyvinyl chloride compositions. Thermal stability of polyvinyl chloride compositions with binary mixtures of stabilizers were determined at 175 ± 0.5°C. Mixtures of stabilizers were found to achieve an increase in color stability of the polymer. Polyvinyl chloride stabilized with cadmium stearate

in combination with CONA II at  $1:4 \cdot 10^{-3}$  mol/mol PVC has significant thermal stability. The carboxylates of sodium and cadmium, as well as of calcium and cadmium, caused bonding of hydrogen chloride to form less active metal chlorides, less effective in dehydrochlorination of the polyvinyl chloride. Stabilizer mixtures were more effective in inhibiting decomposition of polyvinyl chloride than any of the stabilizers alone. Figures 2; references 5: 1 Russian, 4 Western.

6508/12379  
CSO: 1841/215

UDC 661.185.532.694

FOAM-FORMING CAPACITY OF ALKYLARYLTRIMETHYLMONIUM CHLORIDE AND ALKYLARYLISO-THIURONIUM CHLORIDE

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 84 (manuscript received 24 Oct 84) pp 16-19

[Article by N.A. Khodzhakhanov, M.K. Yuldasheva and K.S. Akhmedov, Institute of Chemistry, Uzbek SSR Academy of Sciences; Tashkent Order of International Friendship Polytechnic Institute imeni Abu Raykhana Beruni]

[Abstract] The foam-forming capacity of alkylaryltrimethylammonium chloride (AATMAC) and alkylarylthiuronium chloride (AAITC) was studied by a method involving shaking in a closed cylindrical vessel calibrated from 0 to 1000 ml. The surfactant solutions, 100 ml in volume, were uniformly shaken for 1 minute, the initial volume of foam formed was noted, then the volume of foam was determined at 1, 3, 5, 10 and 20 minutes to determine foam stability. AATMAC and AAITC are both recommended as reagents to be used in oil and gas production as surfactant additives. Addition of one percent gas condensate to the mixture decreases foam formation by a factor of almost 2, 10%--by a factor of 4, while 20% minimizes foam formation. Figures 2; references 6 (Russian).

6508/12379  
CSO: 1841/215

UDC: 678.743.22:66.085.3:532.72

## DIFFUSION PROPERTIES OF RADIATION-MODIFIED PVC

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 10-12

[Article by V.I. Dakin and V.L. Karpov]

[Abstract] A study is presented of the diffusion of solvent in radiation-modified PVC considering the structure of the three-dimensional grids formed. Experimental data were analyzed using an equation relating diffusion coefficient D with the intermolecular mass of chains between grid nodes  $M_c$ . The variation of D as a function of content of additive was studied. An oligomer polyfunctional compound, the polycondensation product of reesterification of dibutyladipinate with monoallylidine pentaerythrite yielded a polymer with more flexible chains in which D does not depend on the content of the additive even with a comparatively dense grid. The liner variation of D as a function of  $M_c$  observed in irradiated PVC + polycondensation product of reesterification of dibutyladipinate monoallylidine pentaerythrite has similar angular coefficients with various contents of this product. The data obtained in this article can be used to predict the diffusion properties of radiation-modified polymers. Figures 2; references 11 (Russian).

6508/12379  
CSO: 1841/252

UDC: 678.724.2+542.943+542.958.3

## MODIFICATION OF HIGH PRESSURE POLYETHYLENE BY EPOXIDATION AND SUBSEQUENT AMINATION

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 21-23

[Article by E.M. Nelkenbaum, Yu.B. Yasman and Yu.A. Sangalov]

[Abstract] A study is made of the epoxidation and subsequent amination of high pressure polyethylene containing the greatest quantity of unsaturated groups in comparison with other types of polyethylene. Epoxidation of polyethylene at the C=C bond under the influence of anhydrous peracetic acid occurs with a high degree of conversion. PMR spectroscopy confirms the presence of oxiran fragments in the polyethylene. Polyethylene containing these groups can attach primary aromatic amines in the presence of acid catalysts. Considering the high reactivity of ozone for amines, an ozonometric method was used to determine the amines bonded to the polyethylene. Aromatic amines are quite active in reaction with epoxidized polyethylene, more than aliphatic amines. The amino groups cause modified polyethylene to manifest properties of a base.

Bonding of an indicator by the polymer stabilizes its color and can be used to color the polyethylene. Replacement of unsaturated groups in polyethylene by polar fragments changes its solubility and thermal oxidation stability. Conversion of low-molecular-wt. polyethylene by epoxidation and subsequent amination of unsaturated groups results in changes of solubility, color, activity with respect to zone and thermal oxidative stability. The modified polyethylene can be used as a technological additive for conversion of polymers and olefin copolymers. Figures 2; references 9: 7 Russian, 2 Western.

6508/12379  
CSO: 1841/252

UDC: 678.5.067.5:621.357.8

#### PREFABRICATED GLASS-REINFORCED PLASTIC GALVANIC BATHS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 33-34

[Article by V.N. Naumets, Yu.V. Mironov, L.A. Naumets and B.V. Petrukhnenko]

[Abstract] Gluing and bolting of standard mass-produced glass-reinforced plastic elements is a promising method for the manufacture of galvanic baths. A large number of different varieties of such elements and baths was analyzed in order to select a design for standard bath elements. It was found that various designs of box-section elements can support assembly of individual sections and entire products, allowing practically complete automation of the process and thus eliminating direct contact of workers with harmful substances in the pressing process. Assembly of baths from individual elements involves assembly, sealing and joining the elements, which are all done in one operation. Chemically resistant sealing paste is applied to joints as they are assembled. Figure 1; references 6: 3 Russian, 3 Western.

6508/12379  
CSO: 1841/252

UDC: 678.5:66.063:726.64

#### PLASTICIZER MADE FROM BUTYL ALCOHOL OXOSYNTHESIS WASTES

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 43-44

[Article by I.P. Lychkin, M.I. Salikova, A.A. Smorodin and I.S. Ruban]

[Abstract] Production of butanol by oxosynthesis produces tons of still residue waste of complex composition, determined primarily by secondary

reactions during hydroformylation. The problem of utilizing these still residues is therefore an important one. 'Salavatnefteorgsintez' Production Association, using existing equipment in a batch process, has begun producing a plasticizer based on these still residues. The plasticizer is equivalent in its properties to phthalates and can be used with the same polymer materials. The plasticizer is primarily a mixture of phthalates of various structures, with density 980-990 kg/m<sup>3</sup>, index of refraction 1.485-1.490, viscosity 75-80.10<sup>-3</sup> Pa·s, flash point below 180°C, volatility at 100°C 0.1-0.2% in six hours, acid number not over 0.3 mg KOH/g, bromine number 40-60 g Br/100g, saponification number 280-290 mg KOH/g. References 8: 5 Russian, 3 Western.

6508/12379  
CSO: 1841/252

UDC: 678.632'550.41

#### USE OF DISINTEGRATORS IN PRODUCTION OF POLYMER MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 48-51

[Article by B.M. Kipnis]

[Abstract] A Minsk 32 computer was used to compute the empirical fluctuation of  $i$  as a function of rotor velocity and initial particle diameter and modulus of elasticity for a disintegrator or two-bladed chopping machine, where  $i$  is an exponential variable. The degree of crushing depends on the number of rows of fingers on the rotors, decreasing with increasing number of rows. When binary mixtures of many polymers are crushed, the additive crushing law is frequently not followed. This results from development on the surface of the rotors of a mixed layer of polymers up to some hundreds of  $\mu\text{m}$  thick, which influences the impact of polymer particles against the rotor surface. For polyethylene oxide, disintegrator techniques based on the use of amine additives are quite competitive with the more difficult cryogenic disintegrator technique. The use of polymer compositions treated in a disintegrator can achieve certain improvements in the technological results of subsequent processes as well as the usage properties of the products produced. Disintegrator treatment of a solution of oligoethyleneglycol maleinatephthalate in triethylene glycol dimethacrylate can decrease gel formation time at 293 K by 10-20% and increase product strength by 10-15%. Figures 2; references 8: 7 Russian, 1 Western.

6508/12379  
CSO: 1841/252

UDC: 678.5.01:543.874

POLYMER MATERIALS WITH REDUCED FLAMMABILITY AND SMOKE GENERATION

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 51-52

[Article by D.Kh. Kulev]

**[Abstract]** The fire safety of polymer materials can be improved by increasing the thermal stability of polymers and increasing the fraction of endothermic processes occurring upon combustion of the polymer by introducing inhibitors. Physical steps which can act upon the process of polymer combustion includes slowing input of heat to the surface of the material by shielding, cooling the combustion zone by carrying away heat, creating obstacles for transfer of reagents to the flame front, blowing the flame away by a stream of gas or shock wave and the application of physical fields. The H:C ratio has the greatest influence on thermal stability and flammability of polymers. Replacement of hydrogen atoms in linear hydrocarbons with halogen atoms increases thermal stability and decreases flammability. The nature of the halogen atom significantly influences production of smoke. The higher the reactivity of the halogen atom, the more probable are reverse reactions. Such hydrogen halides as HI and HBr should inhibit flame reactions more than HCl and HF, but are more effective in the process of carbon particle formation. Sources of additional oxygen in the flame slow the process of carbon black formation. Nitrogen also reduces carbon black formation. Cycle-chain polymers such as polyphenylene oxide, polyphenylene sulfide, polyphenylene ketone, aromatic polyamides, polyesters and polyurea have lower flammability. References 7: 4 Russian, 3 Western.

6508/12379  
CSO: 1841/252

UDC: 678.5.067.5:621.315.6

GLASS-REINFORCED PLASTIC RODS FOR POLYMER INSULATORS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 55-57

[Article by S.F. Shevchenko, A.G. Averyanova, M.I. Fedosyuk, V.B. Kryzhanovskiy, G.A. Mikhaylenko and Yu.N. Shumilov]

**[Abstract]** Glass-reinforced plastic rods are major structural elements capable of operation under the influence of significant mechanical loads in high intensity electric fields. The dielectric strength of a shaped glass-reinforced plastic product is largely determined by its porosity, which in turn depends on the quality of treatment, composition of binder and temperature and

time conditions of molding. Production of 28-36 mm diameter rods requires soaking of 3.5 to 6 times more rovings than does manufacture of 15 mm diameter rods. A treatment device is described for this purpose, consisting of a soaking bath, orienting blade unit articulated to an upright by levers and a rigid feeler block. In addition to soaking quality, porosity and formation of microscopic cracks are greatly influenced by composition of the binder and temperature-time conditions. The binder selected was epoxy resin type ED-20, the hardener was isomethyl tetrahydrophthalic anhydride. The use of these binders and device allows production of 15 mm rods with dielectric strength 56-62 kV/cm. References 9 (Russian).

6508/12379  
CSO: 1841/252

RADIATION CHEMISTRY

UDC 541.15:542.955:547.279.3:547.854.4

ATTACHMENT OF CYSTEAMINE TO THYMINE AND THYMINEMONOPHOSPHATE INDUCED BY GAMMA RADIATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 85 (manuscript received 19 Jun 84) pp 2351-2358

[Article by S.A. Grachev, Ye.V. Kropachev and G.I. Litvyakova, Leningrad Institute of Nuclear Physics, imeni B.P. Konstantinov, USSR Academy of Sciences]

[Abstract] The authors recently reported the formation of 5-S-cysteamine-6-hydroxythymine and 5-S-cysteamine-5,6-dihydrothymine upon gamma radiolysis of aqueous solutions containing thymine and cysteamine. This article studies the mechanism of radiation-chemical bonding of cysteamine with thymine and thymidylic acid. Radiolysis of deaerated solutions containing thymine and cysteamine or thymidinemonophosphate and cysteamine forms products of the cross linking of these compounds, resulting from attachment of cysteamine at the double bond of the base. The radiation chemical yields of the cross linking products depend on the ratio of concentrations of thymine and cysteamine or thymidinemonophosphate and cysteamine in the irradiated solution. The mechanism of formation of the cross linking products results from reactions of H<sup>-</sup>, OH<sup>-</sup> and e<sup>-</sup> adducts of thymine or thymidinemonophosphate with the thymyl radicals of cysteamine. Figures 7; references 17: 6 Russian, 11 Western.

6508/12379  
CSO: 1841/222

UDC 538.113:539.213:542.46

DIAGRAMS OF POTENTIAL CURVES OF RADIATION CENTERS OF GLASS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 25 Jan 85) pp 64-66

[Article by S.S. Kasymova, Zh.K. Komilov and D.M. Yudin, Tashkent Order of Labor Red Banner State Medical Institute]

[Abstract] A discussion is presented of the mechanism of formation of radiation centers (RC) in glass upon exposure to gamma radiation. Diagrams of potential curves in comparison with the base state of the irregular bond excited by radiation and the state of the bond and base state of the radical formed after bond breaking are presented. Breaking of the electron bond results in the development of uncompensated tensile force in areas where the bonds are not broken. The force attempts to transform the broken bond center to metastable equilibrium. The force causes the center to shift to a new equilibrium state which is steady in the radiation field. The location of the radical potential minimum depends on the temperature of the specimens during irradiation. Use of the potential curves diagrams allows deeper determination of the essence of the interaction of optical materials with ionizing radiation and also with powerful light beams, explaining the specifics of EPR spectra related to surface centers. Figure 1; references 5: 4 Russian, 1 Western.

6508/12379  
CSO: 1841/215

UDC: 541.12:541.124.13+535.379:547.412:547.024

PHOTORECOMBINATION OF ATOMS OF I(<sup>2</sup>P<sub>1/2</sub>) WITH C<sub>3</sub>F<sub>7</sub> AND CF<sub>3</sub>CFCF<sub>3</sub> RADICALS

Moscow KINETIKA I KATALIZ in Russian Vol 26, No 5, Sep-Oct 85 (manuscript received 6 Jun 84) pp 1044-1049

[Article by A.M. Provilov, I.I. Sidorov and V.A. Skorokhodov, Scientific Research Institute of Physics, Leningrad State University imeni A.A. Zhdanov]

[Abstract] A study was made of the photodecomposition of perfluoro alkaloids as well as secondary processes involving I atoms and radicals. The work was performed on an installation with a laser light source with wave length 266 nm, mean power 8mW, pulse repetition frequency 50 Hz, light beam diameter 2-3 mm. The time variation of signals and time averaged signals were measured by three recording systems. A rapid process observed in the IR area is found to be photorecombination of I atoms with the radicals. Photorecombination of I atoms

with  $C_3F_7$  and  $CF_3CFCF_3$  radicals does occur, the  $^3Q_0 + A$  state having the minimum on the potential energy surface. Figures 2; references 23: 12 Russian, 11 Western.

6508/12379  
CSO: 1841/299

RUBBER AND ELASTOMERS

UDC: 678.027.003

ECONOMIC EFFECTIVENESS OF USE OF ELASTIC MOLDS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 52-55

[Article by V.V. Voronov]

[Abstract] The use of elastic molds based on synthetic rubbers in various branches of industry is a promising trend in the chemization of the economy. Their use results both in a savings of traditional mold materials and a decrease in labor consumption, allowing more rapid manufacture of products with less mechanical working. This article analyses elastic molds as tools with which to work on raw materials. The effectiveness of utilization of elastic molds is calculated not by the minimum adjusted cost, but rather by factors not expressed in cost. One such factor is the aesthetic appearance of products produced using elastic molds, particularly important in the production of consumer goods. The percentage of defect-free products produced by elastic molds is higher than that produced by traditional molds. One of the most important factors determining the expediency of using elastic molds is decreases in their cost. The annual effectiveness of the use of elastic molds depends on the cost of manufacture of molds from traditional materials and elastic molds, and the annual volume of defect-free products produced.

Figures 3 (Russian).

6508/12379  
CSO: 1841/252

UDC: 678.5.073:678.674:539.389

## RELAXATION PHENOMENA IN POLYESTER THERMOELASTOPLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 16-18

[Article by G.A. Lushcheykin, F.M. Nedvedeva, L.I. Voyteshonok, M.K. Polevaya and L.D. Pin]

[Abstract] Polyethylene thermoelastoplastics (PETEP) obtained from 1,4-butanediol, dimethylterephthalate and polyglycols and polyethylene oxide glycols with molecular weight 1500, a copolymer of tetrahydrofuran and propylene oxide with molecular wt. 1700, polypropylene oxide glycol (PTG) and polybutanediol formalglycol (PBDF) were studied. Curves of the variation of dielectric loss angle tangent as a function of temperature and thermal depolarization as a function of temperature are presented. The thermoplastics contain crystallizing rigid PBTF blocks and, usually, amorphous areas of flexible-chain polymers, resulting in a complex set of relaxation characteristics. The greater the compatibility of the components, the greater the portion of the rigid chain PBTF phase which is included in the amorphous flexible-chain phase and the higher the glass point of the mixture. Figures 2, references 3 (Russian).

6508/12379  
CSO: 1541/252

UDC 547.27/547.514

## RESEARCH IN AREA OF FUNCTIONAL ORGANIC PEROXIDES. Part 17. SULFONYL-CONTAINING DIALKYL PEROXIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 9, Sep 85  
(manuscript received 30 Jul 84) pp 1867-1871

[Article by A.I. Rakhimov, Yu.V. Shatalin, A.V. Baklanov, A.R. Derzhinskiy, L.D. Konyushkin, P.V. Vershinin (deceased) and Ye.N. Prilezayeva, Volgograd Polytechnic Institute and Institute of Organic Chemistry imeni N.D. Zelinskii, USSR Academy of Sciences, Moscow]

[Abstract] Organic peroxides are universal vulcanizing agents for various polymers such as high and low pressure polyethylene, silicone, ethylene-propylene and fluoro-rubbers. However, many of those used for this purpose have low boiling points or form toxic products. Although this may be overcome by introducing high molecular weight groups to the molecule, these reactions are not selective and the yield is below 50%. In the present work, tert-butyl-2-chloroethylalkylsulfone was used to alkylate hydrogen peroxide to form a high boiling sulfone-containing dialkylperoxide suitable for use as a structurizing

initiator for saturated elastomers. Comparison of kinetic parameters shows that the sulfonyl group in the beta-position has no effect on the thermal stability of the peroxide bond. Rupture of a hydrogen atom from the solvent is the main reaction generated during thermolysis of the  $C_8H_{17}SO_2CH_2CH_2O$  radical. References 9: 6 Russian, 3 Western.

12765/12379  
CSO: 1841/207

UDC: 678.027.5:539.18

USE OF LABELED ATOMS METHOD TO STUDY MECHANISM OF FILM FORMATION FROM LATEXES AND PROPERTIES OF FILMS PRODUCED

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 5, Sep-Oct 85 (manuscript received 15 Mar 84) pp 993-997

[Article by V.N. Chernyy and V.I. Yeliseyeva, Institute of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] The purpose of this study was to use radioactive isotopes for quantitative determination of the content of emulsifier in latex films obtained by various methods and to clarify the relationship between the content of emulsifier and properties of films. To perform the study an emulsifier was specially synthesized--sodiumdodecylsulfate containing radioactive sulfur atoms which were then used to produce a series of latexes of varying polymer composition. The objects of the study were films obtained by two different methods from specially synthesized styrene acrylate latexes with varying content of styrene in the polymer. The content of emulsifier was determined both in the initial films and after they had been held in water. The studies resulted in the production of a quantitative method for determining the content of emulsifier in latex films by the use of labeled atoms. Comparison of the content of emulsifier in films of polymers of different chemical compositions with water absorption showed that absorption fluctuates over broad limits for a given emulsifier content and depends primarily on the hydrophobicity and hardness of the polymer. For a given polymer hardness the film formation process is better performed with electrodeposition than with air drying. A quantitative evaluation of the content of emulsifier in films produced by different methods can be used to clarify the mechanism of their formation. To produce latex films with minimum sensitivity to water, one should use polymers with maximum possible hardness. Harder polymers can be used with electrodeposition than with air drying. The addition of small quantities of organic solvent upon electrodeposition from latex leads to better implementation of the film formation process and improves the properties of coatings. Figures 4; references 11: 5 Russian, 6 Western.

6508/12379  
CSO: 1841/163

UDC: 541.182.65(678.046.2+541.8:678.7):539.37

RELAXATION PROPERTIES, MICROSTRUCTURE AND STABILIZATION OF TECHNICAL CARBON IN  
SOLUTIONS OF DIVINYLSTYRENE STATISTICAL RAW RUBBER

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 47, No 5, Sep-Oct 85 (manuscript  
received 29 Mar 84) pp 884-893

[Article by V.L. Lurye and A.A. Trapeznikov, All-Union Scientific Research  
Institute of Synthetic Rubber imeni S.V. Lebedev, Voronezh Affiliate; Institute  
of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] Polymer-filler interactions are the basic processes used in strengthening of raw rubber. The system consisting of divinylstyrene statistical rubber plus technical carbon is interesting because the introduction of the rubber to dispersed furnace technical carbon in a liquid hydrocarbon results in irreversible coagulation of the system. Studies of stress relaxation have shown that introduction of the rubber causes a sudden change in the relaxation curve. In this article, a dispersion of PM100 technical carbon in decane containing 10 mass% technical carbon, polar oil and divinylstyrene statistical rubber (DSSR) was studied by a method using a constant deformation rate with relaxation from steady stress, the stress depending on the deformation rate. The relaxation behavior of the dispersions is described by a discrete relaxation spectrum consisting of five groups of relaxation times. Replacement of polar oil with other types of organic compounds is found to affect coagulation. Irreversible coagulation is prevented when DSSR is added to a dispersion of PM100 containing naphthenic acids, but the dispersion with naphthenic acids separates into layers and loses tackiness when allowed to rest for over three hours. Figures 4; references 42: 32 Russian, 10 Western.

6508/12379  
CSO: 1841/163

UDC: 678.048.212

STUDY OF ANTIOXIDATIVE EFFECTIVENESS OF SECONDARY AROMATIC AMINES IN OXIDATION OF SKS-30 ARK RAW RUBBER

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 8, Aug 85 (manuscript received 13 Nov 83) pp 97-100

[Article by L.V. Koskin, N.M. Rodionova, L.N. Zyuzina and O.P. Yablonskiy, Department of Organic Chemistry, Yaroslavl Polytechnic Institute]

[Abstract] A study was made of the antioxidative effectiveness of a number of secondary aromatic amines in the process of thermal oxidation of SKS-30 ARK raw rubber. Amino compounds were selected so that the donor-acceptor properties of substituents at the phenyl group, as well as the dimensions of the  $\pi$ -electron system of the aromatic groups varied as broadly as possible. Antioxidative effectiveness of amines was estimated on the basis of duration of induction period of thermal oxidation of films of rubber in air at 403 K. Induction periods were determined by infrared spectroscopy. The data indicated that increasing the number of nitro groups in the o- and p-position of one of the aromatic rings of a secondary amine was found to increase antioxidative effectiveness significantly, contrary to expectations. The probable reason for the increased antioxidative effectiveness may be interaction of the nitro group with C radicals of the oxidizing polymer. This would indicate that mixtures of these compounds with inhibitors which prevent oxidation by the reaction with O-radicals with the proper relationship of components could yield more effective inhibitors. This synergism of antioxidative effect of C- and O-radical inhibitors has been observed in other works. References 15: 12 Russian, 3 Western.

6508/12379  
CSO: 1841/161

UDC 678.029.42:678.046

LATEX ADHESIVE COMPOSITIONS WITH WATER-DISPERSED FILLERS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 85 pp 3-7

[Article by S.V. Belikova, D.P. Trofimovich, G.S. Pol'sman and A.P. Abrosimov]

[Abstract] An analysis was conducted on the factors determining adhesive strength of polytrichlorobutadiene latex derivatized by ammonia and filled with technical-grade carbon K354. The carbon was introduced into the latex with sodium alkylsulfonate surfactant. Analysis of the viscosity and strength of the resultant preparations demonstrated that optimal coagulational structure-

formation was attained with K354 and surfactant concentrations assuring maximal filler dispersion, but insufficient for complete saturation of the filler surface with the surfactant. Such adhesives also showed maximal stability in rubber-to-metal contact. Mineral fillers behaved in a fashion analogous to that of K354. However, the strength of bonding of adhesives prepared with aerosil was less than that with K354. Figures 4; references 12 (Russian).

12172/12379  
CSO: 1841/268

UDC 678.027.3

TECHNICAL CAPABILITIES OF PROTECTIVE BAND-SHAPING MACHINE ASSEMBLIES IN TIRE PRODUCTION

Moscow KAUCHUK I REZINA in Russian No 11, Nov 85 pp 23-26

[Article by V.I. Novikov, M.A. Lebedeva, V.G. Lyubashevskaya and B.S. Grishin]

[Abstract] A cursory review is provided of the technical capabilities of machine assemblies used in band-shaping in truck and car tire production, using single and doubled screw-type machines. A flow diagram is provided for the building machines using hot feed in which chafing strips, filler strips, insulation plies and breaker strips are added. Tabular data are also provided on the technical characteristics of such assemblies, and discussion includes optimal temperatures and cutting edge angles. Analysis of such factors and survey of the patent literature indicates that hot feed machines complemented with heating elements provide considerable advantages in the manufacture of tires. Figures 2; references 4: 3 Russian, 1 Western.

12172/12379  
CSO: 1841/268

UDC 678.664.0277.7

PROCESSING OF SKU-PFL-100 PREPOLYMER BY GEL EXTRUSION

Moscow KAUCHUK I REZINA in Russian No 11, Nov 85 pp 26-28

[Article by V.V. Rusetskiy and N.M. Kolesnikov]

[Abstract] Trials were conducted with a cutting press for the fabrication of complicated articles from the polyurethane elastomer SKU-PFL-100, using the latter in the form of a gel. The entire process was reduced to gel formation, extrusion from a cutting press, and removal of fines. The elastomer was cross-linked with diamet X [sic]. Gels with a hardness of 30-50 arbitrary units (TM-2 method) were found most suitable for pressing at a temperature of 110-130°C within a time interval of 2-2.5 h. However, the fact that the hardness of the gel had to be limited to 30-50 arbit. units places serious limitations on using the cutting press approach in fabricating articles from SKU-P -100. Figures 2; references 4: 1 Russian, 3 Western.

12172/12379  
CSO: 1841/268

UDC 615.917.2/.9:597.546:613.632.4

TOXICITY ASSESSMENT OF p-DINITROSOBENZENE

Moscow KAUCHUK I REZINA in Russian No 11, Nov 85 pp 38-39

[Article by Zh.Ya. Lopatneva, S.S. Balabanova, M.M. Plekhotkina and I.I. Datsenko]

[Abstract] Various routes of administration were employed in assessing the toxicity of p-dinitrosobenzene (PDNB) on albino mice and rats and guinea pigs. PDNB was shown not to induce skin irritation or be absorbed via the transcutaneous route. It was determined to be weakly allergenic in guinea pigs, while its LD<sub>50</sub> values for mice was calculated at 1230 mg/kg, 1020 mg/kg for female rats, and 1362 mg/kg for male rats. Exposure of mice and rats via the respiratory route to a concentration of 10 mg/m<sup>3</sup> of PDNB for 3 months was without effect; a single respiratory exposure to 200 mg/m<sup>3</sup> induced some behavioral changes indicating CNS toxicity, while exposure to 120 mg/m<sup>3</sup> under identical conditions was without adverse effects. Rapid bacterial assays of mutagenicity and determinations of carcinogenicity in fish yielded negative results. PDNB thus appears to be a low-toxicity agent. References 11: 8 Russian, 3 Western.

12172/12379  
CSO: 1841/268

## WATER TREATMENT

### PRIZE-WINNING WORK ON LASER DIAGNOSIS OF WATER ENVIRONMENTS

Moscow KOMSOMOLSKAYA PRAVDA 5 Dec 85 p 1

[Article by T. Korsakova]

**[Abstract]** The article salutes a group of scientists who were recently awarded the Leninist Communist Youth League Prize for development of laser methods for diagnosing the condition of natural water environments. Yevgeniy Baulin, Andrey Abroskin, Azret Bekkiyev, Andrey Demidov, Olga Kalaydzidis, Tatyana Gogolinskaya, Valeriy Slobodyanin and Aleksandr Chekalyuk are identified as the members of this group. They worked under the direction of Doctor of Physical-Mathematical Sciences Viktor Vladimirovich Fadeyev. It is noted that the majority of the group's members are or have been associated with the chair of quantum radiophysics of Moscow State University's school of physics. This chair is headed by Academician Leonid Veniaminovich Keldysh.

It is recalled that the idea of using lasers for the study of biological objects was proposed by Academician Rem Viktorovich Khokhlov. Work on the new diagnostic methods began about 10 years ago. These methods are said to employ a laser carried on a research ship. This laser emits a green light pulse, which is reflected by the water. The presence and type of impurities in the water are indicated by the color of the reflected light. Work on the development and testing of the laser methods was done in a laboratory and then during cruises to the tropics.

PTD/SNAP/12379  
CSO: 1841/280

**pH-DEPENDENT VARIATION IN FILTRATION RESISTANCE OF SEWAGE PRECIPITATES DURING RADIOLYSIS**

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 7, No 5, Sep-Oct 85 (manuscript received 16 Nov 84), pp 49-51

[Article by L.G. Shevchuk, V.I. Geraskov and N.A. Vysotskaya, Institute of Physical Chemistry imeni L.V. Pisarzhevskiy, UkrSSR Academy of Sciences, Kiev]

**[Abstract]** Ionizing radiation doses of up to 20 kiloGrays are studied for their effect on the filtration resistance of excess activated sludge and raw sediments in sewage in acidic and alkaline media. A general decrease in filtration resistance is observed, but the filtration resistance of excess activated sludge in alkaline media increases. Reasons for these variations in filtration resistance are given.

/12379  
CSO: 1841/282-P

**OZONIZATION OF BIOCHEMICALLY PURIFIED URBAN SEWAGE**

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 7, No 5, Sep-Oct 85 (manuscript received 14 Nov 83), pp 46-49

[Article by G.I. Rogozhkin, All-Union Scientific Research Institute of Water Sanitation, Canalization, Hydrotechnical Construction, and Engineering Hydrogeology, Moscow]

**[Abstract]** The kinetics and efficiency of ozonation of biologically purified urban sewage for gas and liquid are studied experimentally. Ozone completely oxidizes nitrites, synthetic surfactants, and sulfides.  $\text{BOC}_5$  decreases insignificantly. The concentrations of suspended matter, phosphates, ammoniated nitrogen, and oil do not change in the course of ozonation. Odor and color vanish completely with 6-8 mg  $\text{O}_3/\text{l}$  doses of absorbed ozone. Chemical oxygen demand (COD) decreases linearly and is dependent on the dose of absorbed ozone. The average consumption rate of ozone for a decreasing COD is 1.03 mg  $\text{O}_3/\text{mg}$  of COD. Doses necessary for water contamination up to a preset level vary over a wide range.

/12379  
CSO: 1841/282-P

APPLICATION OF REVERSE ELECTRODIALYSIS FOR DESALINATION OF SOFTENED WATER WITH SIMULTANEOUS PRODUCTION OF HIGH-CONCENTRATION BRINE

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 7, No 5, Sep-Oct 85 (manuscript received 1 Nov 83), pp 39-40

[Article by V.D. Grebenyuk and N.P. Strizhak, Institute of Colloid and Water Chemistry imeni A.V. Dumanskiy, UkrSSR Academy of Sciences, Kiev]

[Abstract] It is shown that reverse electrodialysis can be used in the stable process of simultaneous desalination and production of high-concentration brines without an increase in the overall voltage of the electrodialyzer for both a 0.05 M solution of  $\text{Na}_2\text{SO}_4$  without Ca ions and a 0.05 M solution of  $\text{Na}_2\text{SO}_4$  containing 25 and 50 mg/l of Ca ions. Reverse electrodialysis allows high-concentration brines containing Ca ions to be produced where the Ca concentration considerably exceeds that of the initial solution.

/12379

CSO: 1841/282-P

FUNDAMENTAL TRENDS IN STUDIES ON WATER AND AIR POLLUTION PREVENTION IN 12th FIVE YEAR PLAN

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 11, Nov 85 pp 2-3

[Article by Yu.L. Maksimenko, candidate of technical sciences, chief specialist, Main State Inspectorate, USSR State Construction]

[Abstract] Considerable advances have been made in the past in the USSR in environmental protection, including the prevention of water and air pollution. In the last 9 years expenditures in these directions amounted to some 63 million rubles, with the result that the quality of water in the Volga, Dnieper, Don and Kama rivers, and the inland and Black, Baltic and Caspian seas has improved significantly. Similar success has been encountered in improving the air quality in Kiev, Moscow, Leningrad, Minsk, Riga and other Soviet cities. However, in 1984 only 67.2% of the plan has been fulfilled in terms of pollution reduction due to waste waters, largely as a result of failure of the metallurgical, chemical, materials and energy ministries to implement adequate control measures. To further improve water quality in the USSR during the 12th Five Year Plan, provisions have been made to expand biological and physicochemical water treatment facilities, develop new closed-circulation water system in the various industries, and improve other aspects of water technology. Additional efforts will be made to control and monitor gaseous discharges from various plants and to create and develop novel recovery technology for byproducts lost in this manner. Closer control will be exercised over car emissions in the cities, use of ethanol fuel will be encouraged, and vehicles will be retrofitted to run on natural compressed gas.

12172/12379

CSO: 1841/298

WOOD CHEMISTRY

UDC 661.728.7:543.227

THERMAL STABILITY OF CELLULOSE OXIDIZED WITH NITROGEN(IV) OXIDE UNDER INCREASED PRESSURE

Minsk VESTI AKADEMII NAVUK SSSR: SERIYA KHMICHNYKH NAVUK in Russian No 5, Sep-Oct 85 (manuscript received 5 Feb 85) p 118

[Abstract of article by F. N. Kaputskiy and others, Physical-Chemical Problems Scientific Research Institute, Belorussian State University imeni V. I. Lenin, and the General and Organic Chemistry Institute, Belorussian Academy of Sciences, "Thermal Stability of Cellulose Oxidized with Nitrogen(IV) Oxide Under Increased Pressure".]

[Text] The effect of the conditions of the oxidation of cellulose with nitrogen(IV) oxide on the thermal stability of the end product--monocarboxymethyl-cellulose (MCC)--was studied. It was established that MCC preparations obtained by the oxidation of cellulose with nitrogen(IV) oxide under increased pressure are characterized by less thermal stability. This is related to its increased nitroester group content and the lesser degree of structural orderliness.

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12410  
CSO: 1841/217

## AUTOMATION OF BALAKHNA PULP-AND-PAPER MILL

Moscow NOVOSTI SOVIET TV in Russian 1130 GMT 6 Jan 86

[SUMMARY] A high-productivity automatic roll-packing line has been put into service at the Balakhna pulp-and-paper mill in Gorkiy Oblast. The line is controlled by a miniature computer, which is linked up to all the mill's paper-making machines, its marketing department, and its finished goods warehouse. The computer transmits signals to the six microcomputers on the conveyor belt which then control packing format and timing. The line is also equipped with an original transporter system, which delivers the roll to the measurement station. There, lasers read the roll's nominal data set at the start of its route and pass them on to the computer. Information on which machine the roll was made, by which link and during which shift, as well as size and thickness data, are all recorded. Each roll is packed in only 20 seconds by the new line, which has increased labor productivity four-fold, reduced operating staff by 75%, and fully eliminated manual labor.

/12379  
CSO: 1841/273

UDC: 678.5:547.458.82.033

## FILLED CELLULOSE ESTER PLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 10, Oct 85, pp 42-43

[Article by A.Ye. Kulakova, L.N. Malinin and Yu.I. Vladimirov]

[Abstract] A study is presented of the influence of certain dispersed fillers on the physical-mechanical and technological properties as well as flammability of cellulose ester plastics. Highly dispersed aluminum hydroxide, chemically precipitated chalk, kaolin and talc were used. The fillers were introduced to the composition in the stage of mixing with subsequent homogenization on a laboratory single-screw extruder with screw diameter 25 mm. It was found that the use of fillers increases the thermal stability, hardness and density of the plastics. Shrinkage of molded specimens after heating for two hours at  $125 \pm 2.5^{\circ}\text{C}$  is significantly reduced. Impact toughness, however, is decreased, particularly in plastics with chlorine-containing plasticizer. The introduction of fillers can expand the area of application of the plastics into such areas as the furniture industry and construction. Figure 1.

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UDC 661.728.004.12:661.728.31

COMPARATIVE STUDY OF EFFECTIVENESS OF VARIOUS METHODS OF PURIFYING  
CARBOXYMETHYL CELLULOSE

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 4, Jul-Aug 85 (manuscript received 10 Dec 84) pp 34-36

[Article by M.M. Abdulkhayeva, A.A. Sarymsakov and Sh.N. Nadzhimutdinov, Scientific Research Institute of Chemistry and Technology of Cotton Cellulose; Tashkent Order of Labor Red Banner Institute of Engineers of Irrigation and Agricultural Mechanization]

[Abstract] Preparations of carboxymethyl cellulose for scientific research and special purposes were purified by three methods based on extraction with water-alcohol mixtures. The degree of substitution of the CMC did not change during the process of purification by ethanol-water mixtures at up to the boiling point. The degree of polymerization was decreased by boiling ethanol at 70-80°C, a result of the high temperature rather than the extractant. Best preservation of the initial CMC characteristics with best purification was achieved by the use of a mixture of water and alcohol at 18-25°C for 4 hours with agitation, repeated three times, followed by washing with 96% alcohol. References 10: 8 Russian, 2 Western.

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UDC 331.458(083.74)

NEW GOST STANDARD FOR FIRE TECHNOLOGY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 7, Oct 85 p 31

[Article by N.M. Azarkin]

[Abstract] A new GOST (All-Union State Standard) has been promulgated for fire technology, under the title GOST 12.4009-83 "Fire Technology for Property Protection. Fundamental Types, Disposition and Maintenance (of Fire-Fighting Equipment)". As its title implies this Standard covers the fundamental aspects of currently available fire-fighting technology and their maintenance and location in residential and industrial buildings. Various monitoring standards are set, including distances from fire extinguishers, fire hydrants, sand barrels, etc. to various at-risk areas, including the requirement that the various forms of equipment be inspected at 6 month intervals. A number of innovative changes have to be made in the forest chemistry and hydrolysis industry to insure a greater level of safety. One of the requirements is that

fire safety cabinets in the forest industry be equipped with a minimum of 2 hand-held fire-extinguishers with a 10 liter capacity. In addition to information on the location of fire-fighting equipment, phone numbers of the local fire-fighting brigades should also be prominently displayed.

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UDC 630\*863.5:331.101.386

#### INDIVIDUAL ECONOMIC INDICATORS IN CELLULOSE-PAPER INDUSTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov 85  
pp 17-18

[Article by L.E. Khuovinen, engineering technologist, Sovetsk Cellulose-Paper Plant]

[Abstract] At the Sovetsk Cellulose-Paper Plant economic indicators are calculated for the individual workers in the various shops, a practice that has resulted in a greater feeling of responsibility and practical accomplishments in cost reduction. Depending on the type of work and the shop, some analyses of economic effectiveness are calculated on a daily basis for immediate feedback, followed up by monthly summaries. The net effect is a more economical plant with less waste of both labor and materiel. This practice has led to greater appreciation of untapped reserves and has made it possible to evaluate the contribution of individual workers to plan fulfillment. In 1985, for example, the savings in water, and heat and electric energy amounted to 2.4, 5.5 and 1.8%, respectively.

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UDC 630\*866.5:658.562

#### AUTOMATIC CONTINUOUS CONCENTRATION MONITORING DEVICE IN TURPENTINE PRODUCTION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov 85  
p 20

[Article by A.G. Alaykin, laboratory chief, and T.V. Pshenisnova, engineer, Central Scientific Research Institute of Forest Chemistry; L.P. Bykhova, scientific research group chief, and V.G. Smirnov, plant chief, Gorky "Orgsintez" Plant]

[Abstract] A continuous concentration-monitoring device has been designed for use in turpentine production, which is based on the principle that a linear

relationship prevails between the density of the solution at 20°C and the concentration of turpentine. The key unit is a standard pneumatic sensor of density of liquids designated as PZhS-P. Computer analysis of the derived data showed that the device functions well in the 36 to 51% turpentine concentration range, with an error of  $\pm 1.6\%$ . Figures 2; references 3 (Russian).

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UDC 630\*86.001.89

#### CONTRIBUTION OF SCIENTISTS TO ADVANCEMENTS IN FOREST CHEMISTRY

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 8, Nov 85  
pp 26-27

[Article by Yu.M. Vodolazov]

[Abstract] The 75th Session of the Scientific Council of the Central Scientific Research Institute of Forest Chemistry was held on September 19, 1985. The Session concentrated on the coordination of scientific research for the current year and the plans made for 1986 and the 12th Five-Year Plan. Presenting reports at the Session were A.N. Kislitsyn, head of the scientific Technical Department, L.A. Berlin, group head in the Department, and the laboratory chiefs A.N. Zavyalov, Ye.B. Smirnov and L.A. Yermakova. The basic decisions reached were that the line of products produced by the Forest Industry must be expanded and overall productivity increased, and new sources of raw materials must be sought and utilized with greater efficiency. The Scientific Council approved a line of research planned for the period 1986-1990, with corrections made to ensure greater coordination of the research efforts.

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